The Electrical Industry's Weekly Magazine May 30, 1960

Electrical World

A McGraw-Hill Publication Price 50 Cents

small systems engineering

a special report

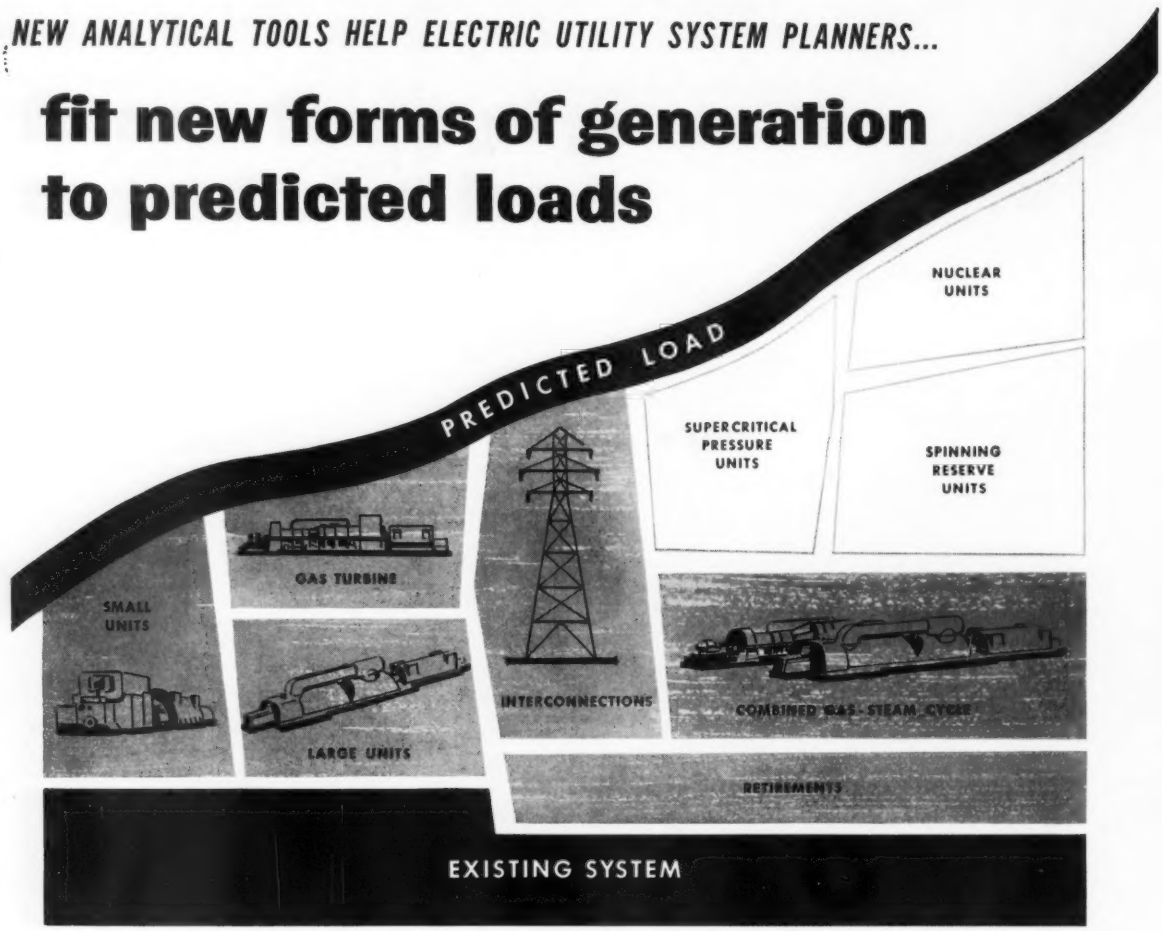
...page 33

European Countri... Look at EHV for Intertie...page 28

UNIV MICROFILMS INC
EDITORIAL DEPT
313 N FIRST ST
ANN ARBOR MICH

NEW ANALYTICAL TOOLS HELP ELECTRIC UTILITY SYSTEM PLANNERS...

fit new forms of generation to predicted loads



POWERFUL NEW MATHEMATICAL TECHNIQUES to analyze the type, size, location, and timing of new power generation facilities have recently been developed by General Electric engineers, working co-operatively with system planning engineers of several electric utilities. These techniques simulate, with a high degree of accuracy, the performance of future systems.

NEW FORMS OF POWER GENERATION, many of them developed by General Electric, now offer electric utilities further cost-saving possibilities. At the same time, vastly different capital-cost and fuel-cost characteristics of new units create a problem of choice. System planners who seek optimum generation expansion patterns are confronted by alternatives more numerous and more complex than ever before.

TO DEVELOP SIMPLIFYING PROCESSES that can counteract processes of complication, electric utility system planners, together with leading electrical manufacturers, have been working to develop more effective analytical tools.

General Electric's new technique, using high-speed digital computers, is the most comprehensive method now available for arriving at accurate cost models of future power generation patterns:

- Units are scheduled on an equal incremental cost basis.
- The computer model accurately represents hourly load variations throughout the period under study.
- Daily load cycles being simulated are continuously modified to accord with days of the week, seasons of the year, and long-term growth trends.
- Units are started and stopped to meet spinning reserve requirements.
- Maintenance is done on the constant-risk principle.

CO-OPERATIVE PLANNING SUPPORT is available to your company. Contact your nearest General Electric Apparatus Sales Office for more information. For a copy of GER-1680, "Computers Aid System Generation Planning," write to the General Electric Company, Section 604-03, Schenectady 5, N. Y.

GENERAL ELECTRIC

Electrical World

Vol. 153, No. 22 MAY 30, 1960

Published for 86 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

In This Week's Issue

CURRENT EVENTS

PUAA Convention Hits 'Censorship'

At annual meeting in New York, Public Utilities Advertising Assn scores IRS ruling, government intervention.....p 30

Europe Moving Toward 400 Kv?

J. H. M. Sykes, EW Overseas Correspondent

Belgian transmission conference sees European regional interconnections probably being stepped up to 400 kv.....p 28

MANAGEMENT NEWSLETTER

Improve Your Customer Contacts

When they investigate irregularities in monthly bills, utilities have a vast opportunity to build goodwill.....p 69

Special Report

p 33

small systems engineering

A 12-page special report examines some of the problems facing managers of the nation's many small utility systems. Specific problems and solutions are examined, and the uses of outside consultants are explored in order to help the manager continue to provide inexpensive, reliable electric service.

Standardization Cuts Construction Costs.....p 35
Job Training Reduces Accidents.....p 36
Computers Help Plan System.....p 37
Formulate Long and Short-Range Plans.....p 40
Voltage Change Provides Operating Economies.....p 42
Start-up Costs Assist Generation Scheduling.....p 44

Departments

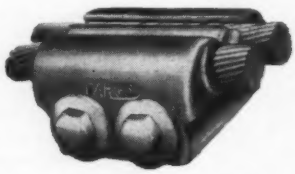
Editorial Comment 25
Electric Utility Methods 45
Electrical Week 13
Engineering Reference Sheet 50
Letters 5
Management Newsletter ... 69
Manufacturers News 56
New Equipment 64
News About People..... 80
Nuclear Notes 16
Politics and Public Power... 14
Procurement & Products.... 53
Readers Service..... 68
Selling 77
INDEX TO ADVERTISERS... 88

A tough job made easy and safe under any conditions. Fargo vise type connectors for copper, aluminum and bi-metal connections are quickly installed even hot.

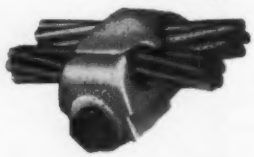
With the one piece design there are no loose parts or threads to engage during installation. The soft, flexible neoprene grommets while positioning the spacer bar do not interfere with the smooth easy operation of the clamp, but do assist in the easy insertion of the tap. Either one or two bolt connectors can be hooked on the run, the tap inserted, and the connection tightened.

The unique, one piece design of Fargo connectors is the answer with a complete range of sizes and types to meet your every requirement.

"5000 Series" . . . 8 - 1,000 MCM
The "V" grooves assure perfect alignment of the conductors in every case while the protected threads permit easy removal even from energized conductors.



"9000 Series" . . . 6 - 605 MCM ACSR
The soft, pure aluminum spacer provides a short, low resistance path between conductors and forms to the contour of the conductors sealing out moisture and corrosive media from the contacts.



"8000 Series" . . . 8 - 4/0 Str.
Only four connectors handle a wide range of conductors. The electrolytic copper spacer gives good conductor separation in addition to a high conductivity current path.

Distributed by
LINE MATERIAL INDUSTRIES
McGraw-Edison Company
Milwaukee, Wisconsin
In Canada, CANADIAN LINE MATERIALS, LTD., Toronto, Canada

Manufactured by
FARGO MFG. COMPANY, INC.
Poughkeepsie
New York

Publisher	Warren W Shew
Editor	Charles F Hochgesang
Senior Editors	Daniel T Braymer Leonard M Olmsted Jesse A Mock
Managing Editor	Herbert R Frankel

Engineering

Midwestern Editor	Edward Allen, Chicago
Western Editor	Paul H Leech, San Francisco
New England Editor	Howard S Knowlton, Boston
Northeastern Editor	Kenneth N McLean
Middle Eastern Editor	Leon A Allen, Jr
Methods Editor	Francis J Kovalcik
Associate Editor	George Swift
Assistant Editor	Willard L Felsen
Overseas Correspondent	J H M Sykes, London
Consulting Editor	Archer E Knowlton

News

Associate Editor	Thomas R Jordan
News Editor	Dale VanHorn
Assistant Editor	John D Damon
Assistant Editor	William F Burke
Dir, News Bureau	John Wilhelm
Mgr, Washington Bureau	George B Bryant, Jr

Procurement & Products

Associate Editor	Paul F Roman
Assistant Editor	Elizabeth R Parker

Art

Art Director	Frank C Stockman
Layout Artist	Wayne A Trapp
Editorial Assistant	Steven Ludwig

Special Services

Mgr, Market Research	Arthur J Stegeman
Dir, Economics Dept	Dexter M Keezer

Advertising

District Managers: W R Klein, L R Lawrence, D J Roberts, New York; L R Lawrence, Boston; F P Coyle, Philadelphia; M S Kearney, E F Coffey, Jr, Cleveland; E F Coffey, Jr, Detroit; M S Kearney, Pittsburgh; W H Meneilley, J T Schaefer, Chicago; J T Schaefer, St. Louis; Russell Antles, Los Angeles, R C Alcorn, T H Carmody, San Francisco; Robert H Powell, Atlanta; F E Holland, Dallas; John Patten, Denver.

Business Manager	Otto A Drechsel
Asst Business Mgr	John F Dugan
Promotion Manager	Donald K Ellis
Circulation, Sales Service	E Bryson Sessions

ELECTRICAL WORLD

Vol. 153, No. 22, May 30, 1960

Published weekly by McGraw-Hill Publishing Co., Inc., James H. McGraw (1860-1948), Founder. Executive, Editorial, Circulation and Advertising Offices: McGraw-Hill Building, 330 West 42nd Street, New York 36, N. Y. Printed at 99-129 North Broadway, Albany 1, N. Y. See panel below for information regarding subscriptions or change of address.

Officers of the Publications Division: Nelson L. Bond, President; Shelton Fisher, Wallace E. Truesdell, Senior Vice Presidents; John R. Callaham, Vice President and Editorial Director; Joseph H. Allen, Vice President and Director of Advertising Sales; A. R. Venezian, Vice President and Circulation Coordinator. Officers of the Corporation: Donald C. McGraw, President; Joseph A. Gerardi, Hugh J. Kelly, Harry L. Waddell, Executive Vice Presidents; L. Keith Goodrich, Vice President and Treasurer; John J. Cooke, Secretary.

Subscriptions are solicited from executive, supervisory, and engineering personnel in electric utilities, manufacturing companies, and related fields; and from consulting engineers and electrical engineers in industry. Position and company connection must be indicated on subscription orders. Send to address shown in box below.

United States and Canada subscription rate for individuals in the field of the publication $6.00 per year; single copies 50 cents. Other Western Hemisphere and the Philippines $20.00 payable in advance and other countries $30.00 payable in advance.

Second-class postage paid at Albany, N. Y. Title registered in U. S. Patent Office.

Copyright 1960 McGraw-Hill Publishing Company, Inc. All rights reserved. Permission required to reproduce any or contents. Printed in U. S. A.

Unconditional guarantee: Our primary aim is to provide subscribers with a useful and valuable publication. Any comments or suggestions for improvement will be most welcome. On written request from any subscriber, the publisher agrees to refund the unused portion of the subscription price.

SUBSCRIPTION AND ADDRESS CHANGES: Send subscription correspondence and change of address to Fulfillment Manager, ELECTRICAL WORLD, 330 West 42nd Street, New York 36, N. Y. Subscribers should notify Fulfillment Manager promptly of any change of address, giving old as well as new address, and including postal zone number, if any. If possible, enclose an address label from a recent issue of the magazine. Please allow one month for change to become effective.

Postmaster . . . Please send form 3579 to Electrical World, 330 W. 42nd St., New York 36, N. Y.

LETTERS

Reply to Heating Manual View

To the Editor:

In your issue of May 9 you published a letter from Mr. C. L. Stanford which took a remarkably dim view of our recent special editorial project "A Manual of Electric Space Heating 1960." Many of your good readers may not be familiar with this report and they should be told that your correspondent's comments are not at all typical of industry reaction. We have had only the most generous commendations and the persistent flow of orders for reprints already totals some thousands.

Our Manual was most carefully prepared as a practical aid and reference for electrical engineers and electrical contractors who are professionally or practically involved in the design, application and installation of electrical heating systems. While the presentation is technically rigorous, its main purpose is to provide up-to-date and immediately useful data and information for those actually engaged in the business.

The best reply to your correspondent's remarks is, of course, the report itself. We shall be glad to provide reprints, at nominal cost, to interested readers of Electrical World on request.

W. T. Stuart, Editor
Electrical Construction and Maintenance
330 W 42nd St
New York 36, N. Y.

▶ The report to which Editor Stuart refers is one of the most comprehensive efforts to compile data on electric house heating of which we know. We believe every utility man interested in heating will want to make use of it.

Appreciation for Cooking Report

To the Editor:

We, at Hotpoint, should very much like to express our sincere appreciation for the wonderful job performed by your editorial staff in compiling the 5th annual special report on commercial cooking in the April 18 issue of Electrical World.

As you may be aware, Hotpoint undertakes the preparation of this annual study as an industry service. We have always been grateful for the whole-hearted cooperation offered by your editors in bringing these special reports so vividly, graphically and informatively to the attention of utility readers.

Cecil Grahame—Mgr, Sales Promotion
Hotpoint Div, General Electric Co
5600 W. Taylor St.
Chicago 44, Ill.

This column is your forum in Electrical World. We invite your comments, suggestions, criticism. Correspondence should be addressed to "Letters Editor," Electrical World, 330 W 42nd St, New York 36, N. Y.

The Pole Star® Distribution Transformer Core has a new ECHELON LAP

result:

- LOWER LOSSES
- LOWER EXCITING CURRENT
- LOWER IMPEDANCE
- IMPROVED REGULATION

When the Pole Star lap-on-top core was introduced by Pennsylvania Transformer in 1947, its electrical efficiency represented a major improvement over previous standards for distribution transformers. This leadership has been maintained for more than a decade.

Now, Pennsylvania again takes a long step forward—by giving the Pole Star core a "new look" that reduces total losses as much as 9%, and exciting current as much as 46%. The new design also provides improved regulation, and lower impedance.

New Compact Design Retains Service-Proved Principles

In the new, patented design, the lamination laps (still on top of the core) have been arranged in an "echelon" pattern that results in a highly compact, efficient structure with outstanding magnetic properties. Laminations nest snugly together, with no appreciable build-up of steel at the top of the core.

As in the original, time-proved Pole Star core, laminations are individually lapped as the core is built into the coil. Each lamination thus forms its own magnetic path, and no flux has to cross from one turn to the next.

Electrical Data Now Available

Use of the new "echelon" core is being extended throughout the entire line of Pole Star Distribution Transformers. For electrical data on specific units, write to Distribution Sales, Pennsylvania Transformer Div., McGraw-Edison Co., Canonsburg, Pa.

McGRAW-EDISON

Example: 7200-volt line; average for all kva sizes

Characteristic	% Improvement over Previously Published Data
Total Loss	7%
Iron Loss	14%
Copper Loss	4%
Exciting Current	39%
Impedance	10%

PENNSYLVANIA DISTRIBUTION TRANSFORMERS

You can save money on inventory with Graybar as your auxiliary warehouse

Use Graybar as your auxiliary warehouse and you can shorten your stock on most electrical equipment and supplies. Graybar stock designed for utility use is near at hand, wide in range, and large enough for any contingency.

This means that you can materially lower either the interest charges on inventory or the cash investment you have in it.

Other savings: you can reduce losses on surplus, on obsolescence, on equipment damaged in receiving and storing.

Start with a local call . . . Why not consult with your Graybar salesman and discuss a specific plan based on your system needs?

Employee-owned Graybar, a part of your local community, has served utilities continuously since the first lines went up. Whether you require 3 items or 3,000, Graybar is your most practical source for most electrical utility equipment and supplies.

When Graybar is your auxiliary warehouse—	You save on storeroom costs Reduce inventory investment Insure prompt delivery Step up man-hour efficiency Simplify bookkeeping

932

GraybaR

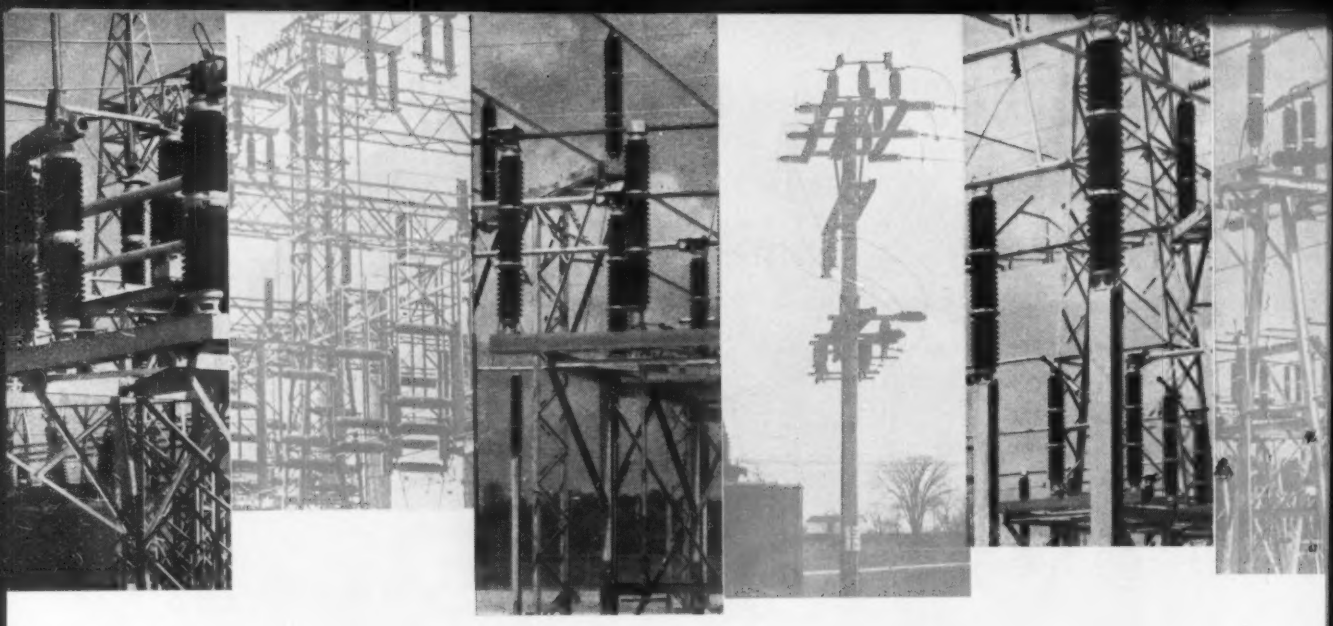
ELECTRIC COMPANY, INC.

420 Lexington Avenue, New York 17, N.Y.

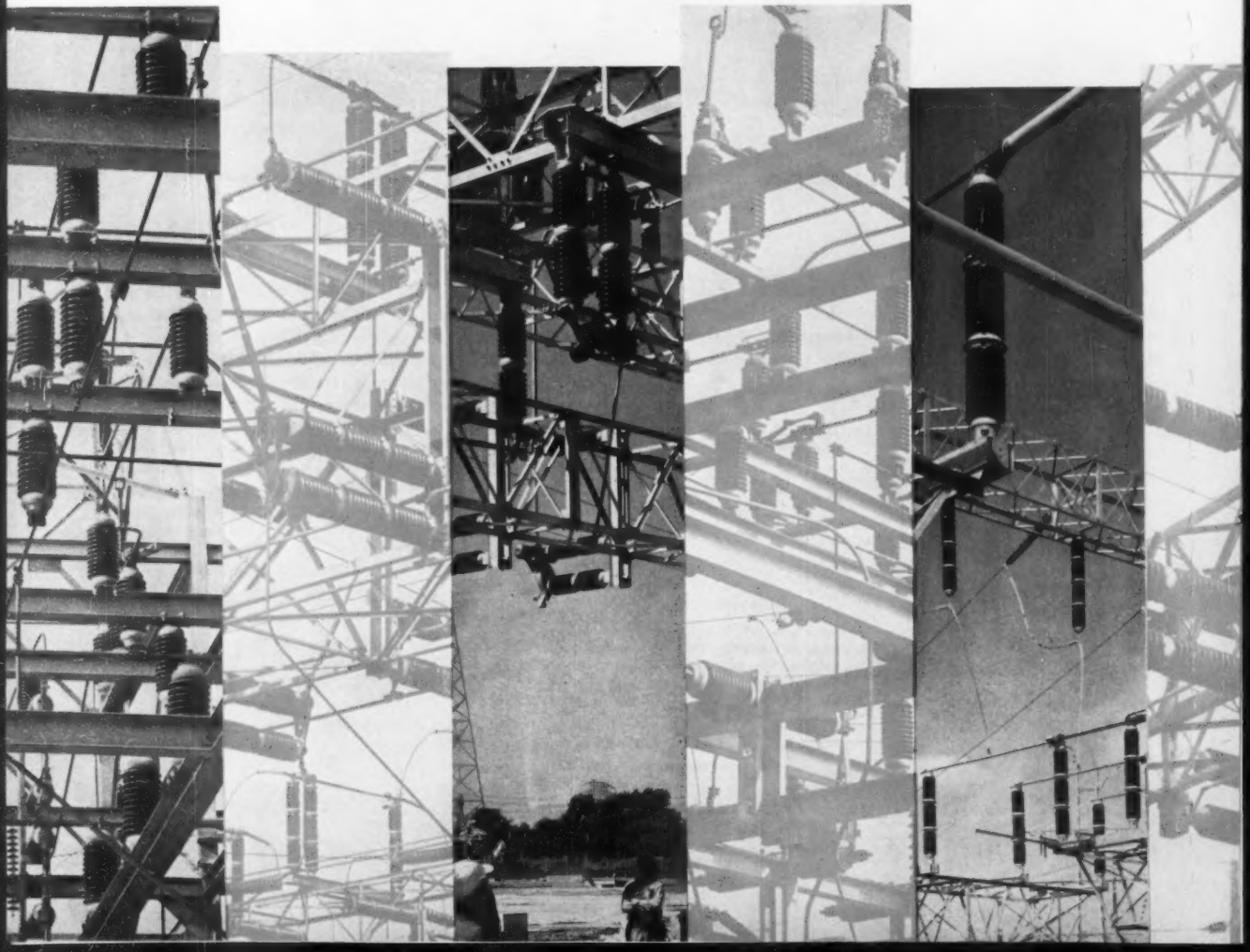
Everything Electrical — GraybaR Electric Company

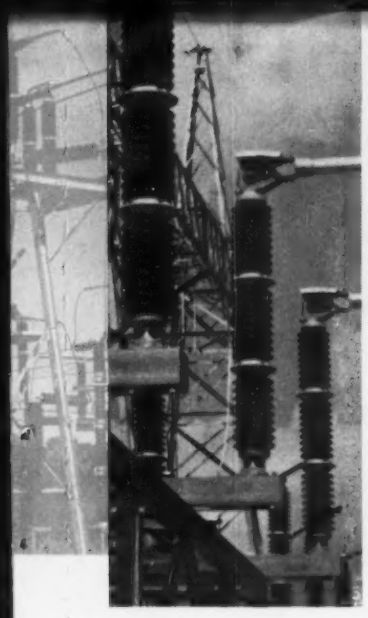
IN OVER 130 PRINCIPAL CITIES

LOCAL SERVICE TO UTILITIES THROUGH COAST-TO-COAST WAREHOUSING

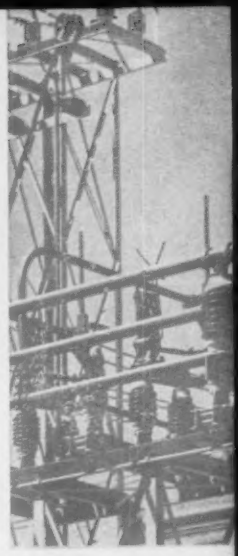


When you design with Lapp Station Posts....

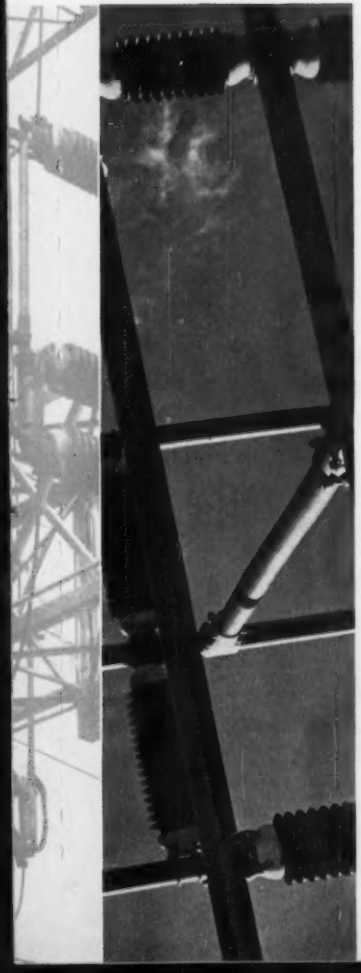




Voltage Rating kv	BIL, kv	Cantilever Strengths, lbs.		
7.5	95	2,000	4,000	8,000
15	110	2,000	4,000	8,000
23	150	2,000	4,000	8,000
34.5	200	2,000	4,000	8,000
46	250	2,000	4,000	8,000
69	350	1,500	4,000	6,000
115	550	1,700	2,900	4,000
138	650	1,450	2,450	3,900
161	750	1,200	2,000	3,500
	900	910	1,450	2,750
	1050	750	1,170	2,300
	1300		1,000	2,000
	1470		900	1,750
	1640		770	1,550
	1800		680	1,400



.....you can have what you want in BIL, in strength, in stiffness



Use of Lapp Station Posts frees designers of modern substations from the need to design around characteristics —and shortcomings —of conventional switch and bus insulators.

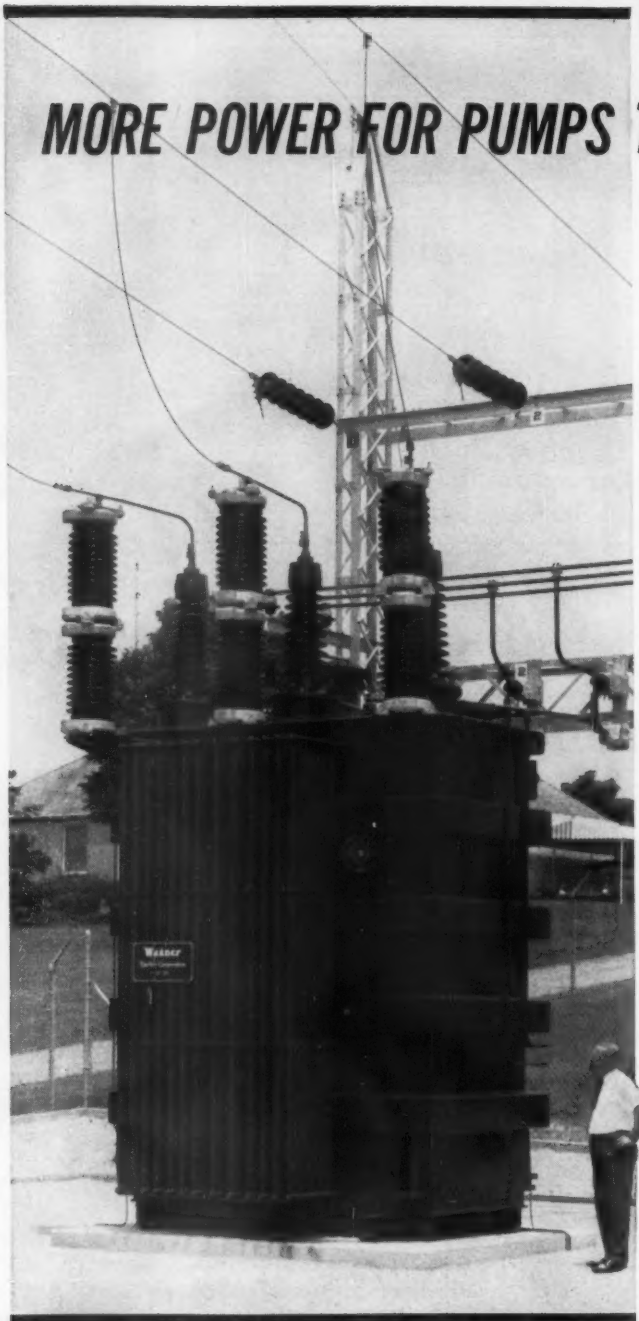
The family of Lapp Station Posts is a "modular series" which gives widest range of insulation levels *and* strength ratings. Station Posts are smaller in diameter, too . . . lighter in weight . . . stiffer . . . easier to assemble; and they're suited to mounting horizontally, underhung or angled . . . available in strengths greater than have ever been offered in conventional pin-cap units.

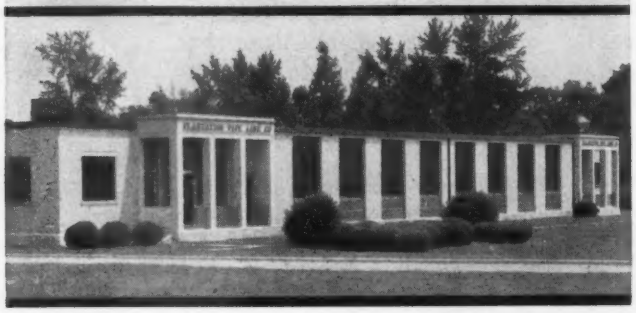
Stations on Lapp Station Posts require less real estate, less steel work. And, because their performance is better under all electrical conditions and mechanical loading, they need less maintenance too. You should have the whole story. You can read it in the new Lapp Catalog No. 8. If you haven't a copy, we'll be glad to send one.

Lapp Insulator Co., Inc., LeRoy, N. Y.

Lapp

MORE POWER FOR PUMPS THAT PUSH PETROLEUM





THIS WAGNER TRANSFORMER

POWERS-UP

PLANTATION PIPELINE

The Plantation Pipeline Company pumping station at Neese, Georgia, is part of an underground transportation system that pushes high quantities of petroleum products to their market.

The Neese operation was originally served with power from a 44 kv system substation. However, the size of the pumping load—which includes some 1800 hp motors—became too great for the substation to handle adequately.

To better serve the load, Georgia Power Company recently installed a 110 kv line and built a new substation. Wagner Electric Corporation furnished the transformer rated at 7500 Kva for this purpose. Today, Plantation Pipeline pumps with full power.

Now, what about your power needs? If they present a critical (or even a potential problem), call your nearby Wagner Sales Engineer. He'll help you plan your power program . . . suggest Wagner transformers that will meet your needs for years to come. There are Wagner branches in 32 principal cities.

Wagner Electric Corporation

6456 PLYMOUTH AVENUE,
ST. LOUIS 33, MISSOURI

WT60-8

SERVING 2 GREAT GROWTH INDUSTRIES—*ELECTRICAL • AUTOMOTIVE*

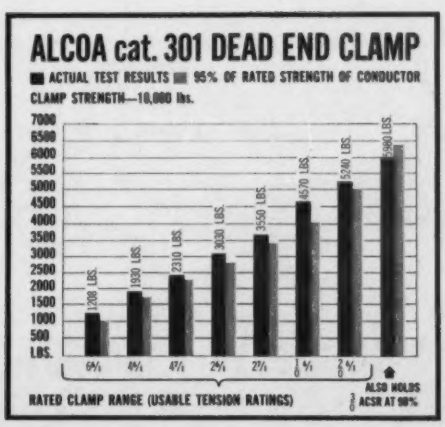
ALCOA ALUMINUM

ACCESSORIES ROUNDUP

Very new dead-end clamp

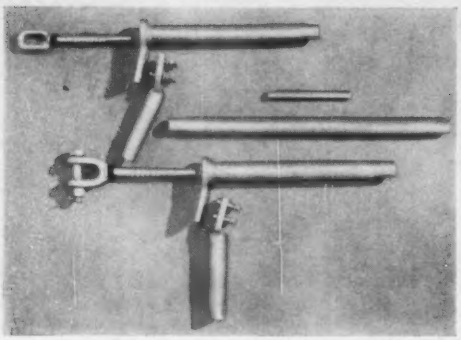
We say "very" new to emphasize the importance (to you) of this clamp. It's designated 301 in our catalog. But that doesn't begin to tell you of its many advantages. Possibly the first thing you will notice is the ½-inch aluminum U bolt. That's right—½-inch high-strength aluminum alloy with Alumilite 205 finish and grease film. And the clamp itself? It's compact, cast in one piece of a high-quality aluminum alloy noted for its corrosion resistance. The large pulling eye is an integral part of the structure of the clamp. Makes it easy to use the hoist hook. What about holding power? This full-tension clamp will hold 95% of the rated strength of the conductors for sizes No. 6 to 2/0 ACSR. The bar chart appearing below gives you the full story.

You'll appreciate, too, how easy this new Cat. 301 dead-end clamp is to thread. No kinking or twisting, because that long bolt gives you plenty of freedom. We've also paid attention to details—Alclad washers, the sheared clevis pin for hot stick use, aluminum cotter pin, and such. The biggest news of all may well be price. We'd be happy to discuss it (and all the reasons why the Cat. 301 is such a value) with you.



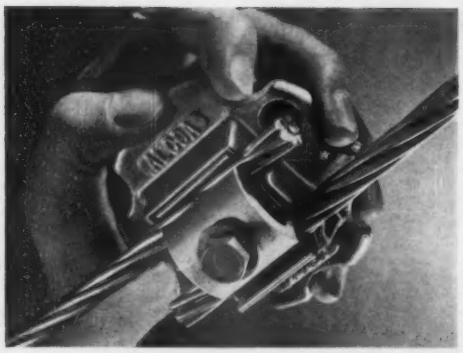
The question of clamp ratings

How do you rate a clamp? If the figure you've been accustomed to receiving represents the rating of the clamp itself before it breaks, have another go at it. What really counts, as you well know, is the holding power on the conductor—not the tension required to pull the clamp apart. Consequently, we always refer to how the clamp holds the conductor as the usable tension rating. So we provide you with the usable ratings for Alcoa clamps. Makes sense, doesn't it?



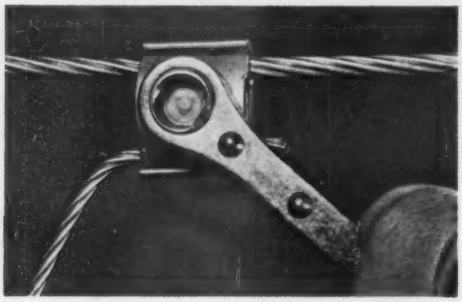
What to look for in tubular line accessories

Take a look at the picture. These tubular accessories you will find easy to handle and install. Spacing of bolt holes of dead-end tongues is standardized so you can fit any terminals to any dead-end body. Where desired, the tongue can be positioned radially about the axis of the conductor before compression. Note, too, that the 15° angles on dead-end tongues and terminals means you can place the jumper loop in either perpendicular or 30° position with the same accessories. Every item is marked with catalog identification, dies required, and position for compression. Conductor goes in easily. Available for use with standard conductors up to 1,590,000 CM, as well as many of the "special" and large-diameter conductors for extra-high-voltage applications.



No more kinking

Why didn't someone think of this before? Deceptively simple in appearance, this wheel-like device holds small parallel-groove clamps, so you can apply torque to the bolt without kinking the wire. In fact, the holder wheel holds two clamps—the Cat. 490.0 for #6-#2 AWG on one side, and the Cat. 396.6 for #6-2/0 ACSR on the other. The grooves on the periphery of the wheel give you a good grip when wearing gloves. What it adds up to is no kinking—a big difference in the appearance of your service lines. Made from aluminum (of course!), the wheel is priced at just $1.00. How many can you use?



How tight is right?

Nobody will argue that bolts must be tight. But how tight? Because they are greased and have smooth surfaces, Alcoa aluminum bolts for accessories develop high tensions at relatively low twisting forces. So, putting the right pressure on—without using an expensive torque wrench—requires skill. How to do it easily by measuring rotation of the bolt in small pg clamps is spelled out in an illustrated bulletin. Send for a copy.

ROME CABLE DIVISION OF ALCOA
Rome, New York

Please send me the items checked below:

- ☐ Data on Cat. 301 dead-end clamp
- ☐ Tubular compression accessories catalog
- ☐ Information on ordering the new Alcoa holder wheel
- ☐ "How tight is right" bulletin

Name .....

Title .....

Company .....

Address .....

ROME CABLE
DIVISION OF **ALCOA**

The Electrical Week

LATE NEWS ▶ **Washington Wire** . . . Sens Frank Moss (D-Utah), Ernest Gruening (D-Alaska) and Edmund Muskie (D-Me.) introduce resolution calling for continued study of US and USSR relative power developments . . . House Foreign Affairs Committee approves Amisted Dam, to be built jointly by US and Mexico across Rio Grande. New bill calls for 100-Mw federal plant; previous bill would have permitted co-op or local public power to lease and develop power facilities at dam.

Around the States . . . Washington Water Power to buy all the common of Shoshone Natural Gas . . . California PUC refuses to reconsider earlier ruling that utilities must pass tax savings from liberalized depreciation on to customers.

Six more utilities propose selective sampling of watthour meters for regulatory commission approval . . . Add Duncan's name to those manufacturers now using magnetic bearings in watthour meters. See p 56.

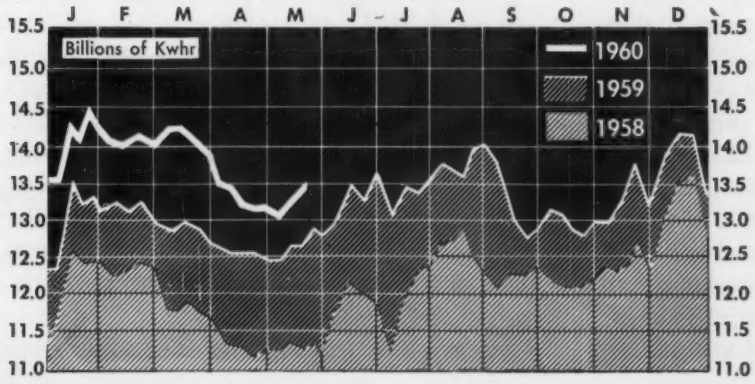
FPC orders Duquesne Light Co to show cause why it violated Federal Power Act in accounting of its deferred taxes in 1958.

Northern States Power and Minnesota P&L plan 230-kv tie between their systems. Line will be 142 miles long, will cost $8.3 million.

NRECA wins Chicago Advertising Federation award for its national ad campaign. Prize is for "best corporate image" advertising.

Management changes . . . Washington Water Power elects G. M. Brunzell president; K. M. Robinson remains chairman and chief executive officer . . . Dallas P&L names E. W. Rogers vp . . . H. S. Weatherby becomes vp and controller, Rochester G&E . . . Jersey Central P&L elects F. I. Smith vp . . . Frank Kitzmiller becomes LBE Inter-Industry Coordinator.

WEEKLY POWER OUTPUT—UP 4.2% (Week ending May 21), Kwhr 13,468,000,000



Per Cent Change From Previous Year

	May 7	May 14	May 21
Total U. S.....	+ 3.8	+ 5.3	+ 4.2
New Eng.	+ 7.5	+ 7.9	+ 3.6
Mid. Atlan.....	+ 6.3	+ 4.9	+ 3.2
Cent. Ind.	+ 2.1	+ 4.9	+ 0.9
West. Cent. ...	+ 3.9	+ 5.4	+ 3.7
Southeast	+ 3.8	+ 5.9	+ 5.1
South Cent. ...	— 2.0	— 1.1	+ 4.5
Rocky Mount...	+ 8.0	+ 7.5	+ 7.9
Pacific			
NW	+ 6.5	+ 7.8	+10.6
SW	+ 5.0	+ 7.7	+ 7.5

Seasonally Adjusted Index 271.4
Week Ago 270.2 Year Ago 255.1

Source: Edison Electric Institute

Preview of This Issue

EVENTS ▶ **House Appropriations Committee hits the federal power agencies** in the "pocket nerve," at recent budget-slashing voting on next year's Appropriations Bill. TVA, Bonneville, SPA and AEC were all cut. Details on **page 26** . . . Middle South Utilities runs into SEC opposition on its stock option plan for executives. Opposition is based on Middle South being a holding company **(p 27)** . . . Europe is considering 400 kv for regional interconnections **(p 28)** . . . More indictments against electrical manufacturers as sentencing in earlier cases is postponed **(p 29)** . . . PUAA hits "censorship by taxation" **(p 30)** . . . EEI sees private capacity quadrupling by 1980 **(p 31).**

SPECIAL REPORT ▶ SMALL SYSTEMS ENGINEERING **The multitude of small electric systems in the US** overshadow the giant utilities in number, if not in load and investment. Lacking the specialized staff of a larger utility, the small system manager must be a man of many talents. Often he must go outside his own organization to secure the trained people necessary to operate and plan today's complex electric systems. EW's first **Small Systems Engineering Report** examines these and other problems which are especially aggravating for the small system manager, and discloses some solutions obtained which may find wider application. This new 12-page special report begins on **page 33.**

Politics and Public Power

THE SELLING RATE OF TVA BONDS

How fast does the Tennessee Valley Authority plan to sell its bonds?

The answer to that question may come as a surprise to more than one interested group, judging from some remarks made recently by TVA Director Arnold Jones before the Municipal Forum in New York.

Jones told the New York meeting that TVA plans to sell $450 to $500 million worth of bonds in the next four years. This indicates a yearly selling rate considerably lower than the $150 to $200 million a year which the four syndicates formed to sell the bonds had anticipated.

Jones pointed out that the Authority has contracted for the manufacture of or has under construction 3 million kw of new capacity. This, he said, would involve an outlay of $650 million, and that $150 million—one-fourth of it—had already been financed.

Then he added that a third or more of the remaining $500 million would come from net revenues.

Now, what are the implications for the slower-than-expected bond-selling rate for groups interested in TVA?

First of all, the news probably was warmly received by Tennessee's Congressional delegation, several of whom feared they might have to ask Congress to raise the bond authorization limit above its present $750 million before the first term of the incoming President had been finished.

Secondly, several river development organizations in the Tennessee Valley which have confidently expected extensive new dam construction may be disappointed.

If, as has been the case at Melton Hill Dam

PROCUREMENT & PRODUCTS ▶ **Will copper average 31¢ a lb this year?** That's the prediction of a leading mining journal despite the fact that copper has hovered at 33¢ a lb since early in the year **(p 53)** . . . Manufacturers announce new anti-friction watthour meters **(p 56)** . . . Air switch for 230 kv is rated at 1,200 amp . . . Disconnect switch for indoor/outdoor switchgear rolls out for convenient maintenance . . . Cutout for extra-heavy-duty service interrupts 14,000 amp up to 7.8 kv **(p 64).**

MANAGEMENT ▶ **A big change in kwhr use often means a personal call**—and a chance to build goodwill. What the customer thinks, however, depends upon how the call is handled. Seattle City Light gives some pointers on this matter on **page 69** . . . **Are you overworked?** Before blaming your job, you may do well to take a hard look at yourself. "Overwork" may only be a symptom of much deeper trouble **(p 71).**

SELLING ▶ **New Jersey to get 6,000 Gold Medallion Homes in one project** . . . How are appliance sales going? Survey for National Industrial Conference Board on consumer buying for '60's 1st quarter shows all major appliances up except TV and clothes dryers **(p 77).**

NEXT WEEK ▶ **Read about latest developments in lightning protection of generators.**

on the Clinch River, TVA is being asked to pay the entire cost of new dam power installations out of self-financing bonds, the slow schedule for issuing bonds may mean very few dams will be started in the next four years.

These river development groups probably will try to head off any TVA decision to go light on new dams. The fact that power facilities at relatively small Melton Hill will cost TVA $23 million in self-financing funds indicates how sizeable might be the drain if the Authority should undertake any extensive dam-building program.

There is, however, another and quite different possibility . . .

The same TVA power staff which 20 years ago made a case for cheap hydro power insists today that steam is less expensive. Now, under its bond act TVA may use bond revenues for power facilities only. Therefore, any dams which are built would have to be financed from other than bond funds, which means appropriations or corporate revenues.

This would mean that flood control dams could be built from appropriations without drain on TVA-bond funds. Result: TVA power engineers could continue their power supply program with steam generation, the self-financing-bond funds would be protected, and the river-development people would get their dams.

And politically this could be interpreted to mean that the Corps of Engineers, which is charged with the building of all dams on all rivers in the eastern U.S. except the Tennessee, is being discriminated against: For the Corps must depend on relatively high-cost power to help justify its dams. This, in turn, touches on the incremental-cost controversy.

Nuclear Notes

Prototype fuel for Philadelphia Electric's Peach Bottom gas-cooled reactor will be tested in a helium-cooled loop, which will be installed in the GE Test Reactor at Vallecitos. General Dynamics, designer of the reactor, has contracted for the work . . . Maryland State Health Dept has started monitoring background radiation levels at three locations near the Peach Bottom site.

Yankee Atomic Electric's construction is ahead of schedule. The builders hope the pressurized-water reactor will go critical by July 1, about a month early and that the plant will be on the line by the end of the year.

License for construction has been issued by the AEC to Consumers Power Co of Jackson, Mich., for its 50-Mw (potentially 75-Mw) UO_2-fueled BWR at Big Rock Point.

German AKS utility group of Stuttgart is proceeding with $670,000 preliminary design of its 150-Mw organic-moderated nuclear plant. Designer is Atomics International. Further work will bring total preliminary costs to $1½ million, half of it to be paid by the West German government under its policy of subsidizing private interests to get West German nuclear industry on its feet.

New company, Nuclear Utility Services, Inc, of Washington, D. C., has been formed to help electric utilities with the technical side of planning and operating nuclear plants. President and founder John E. Gray comes from Duquesne Light, where he was project manager for design and construction of Shippingport, then coordinator of atomic power. NUS will advise on fuels, sites, operation, maintenance, waste disposal and managerial problems peculiar to nuclear power.

"We shall continue to support Euratom," AEC chairman John McCone has assured. His statement counters the apparent attitude of Congress' junketing factfinder Robert McKinney, who has obdurately avoided any contact with Euratom men in his discussions at Bellagio, Italy. McKinney was appointed by the Joint Committee on Atomic Energy to determine Western Europe's nuclear research capabilities.

Discussion of the "Nuclear Incident at the Idaho Chemical Processing Plant" —the nuclear excursion or runaway there last Oct. 16—is available from the Dept of Commerce's Technical Service, Washington 25, D. C., for $2.25.

"Radioisotopes in Science and Industry," an AEC special report, discusses developments of new applications for tagging stored gas, inspecting pressure tubes and studying metal wear among a wide range of other uses and studies. Copies are obtainable from the Government Printing Office in Washington at $1.25.

This is L-M's Transformer *Silver Anniversary*

YOUR L-M FIELD ENGINEER is anxious to discuss the numerous qualities of the new, safe, durable Levroc coating. Ask the Field Engineer to show you this sample of Levroc-coated steel.

New L-M Levroc™ Transformer Coating Reduces Outages, Improves Continuity

New thermoplastic cellulosic coating on transformer covers combines high dielectric strength and excellent protection against weather.

by **A. R. WAEHNER**
Director
Transformer Product Sales
Line Material Industries

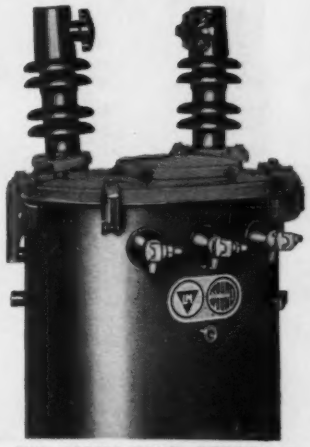
Line Material Industries will apply a new cellulosic coating, Levroc*, on all Round-Wound® distribution transformer covers above 5 kv. This new ice-blue-colored coating combines high dielectric strength with excellent weather resistance, thus reducing outages caused by birds and squirrels.

Levroc is especially formulated for the dual role it plays. It completely coats and adheres to the surface it protects. Since it is applied by the fusion bond process, over a special primer, Levroc coats all edges, corners and projections with equal thickness. It is unaffected by the texture and contours of the surface it coats. It provides an extremely smooth surface, free of all sags, pock marks or drip marks.

This smooth coating is impervious to moisture, salt spray, oil, and grease. It has high scratch resistance and is virtually chip-proof. Levroc is tough, but not brittle.

Get Complete Information

Your L-M Field Engineer has samples of this new coating. Learn how Levroc provides safety to your system and protection to the transformer. Call your L-M Field Engineer or write me at Line Material Industries, Milwaukee 1, Wisconsin.



THE LIGHT BLUE COLOR of the Levroc coating clearly distinguishes it from painted transformer covers.

**Levroc coating available for entire transformer tank at slight extra cost.*

LINE MATERIAL Industries *Distribution Transformers*
McGRAW-EDISON COMPANY

DISTRIBUTION TRANSFORMERS • KYLE RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS • POWER SWITCHING EQUIPMENT
PACKAGED SUBSTATIONS • CAPACITORS • REGULATORS • OUTDOOR LIGHTING • LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE AND CONDUIT

McGRAW EDISON

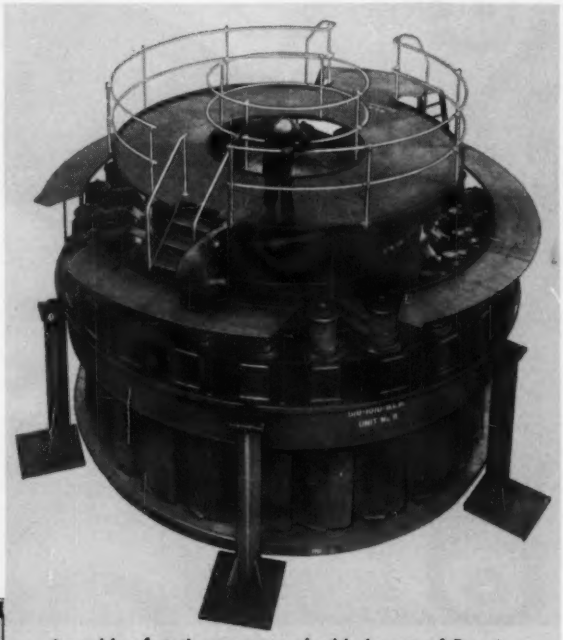
Niagara—2,000,000 kw power plant with turbines built by B-L-H

The most powerful hydraulic turbines ever made in the United States—that's what B-L-H is building for the Niagara Power Project, now under development by the Power Authority of the State of New York. These Francis-type behemoths are each rated at 200,000 hp when operated for highest efficiency at 120 rpm under 300-ft. head.

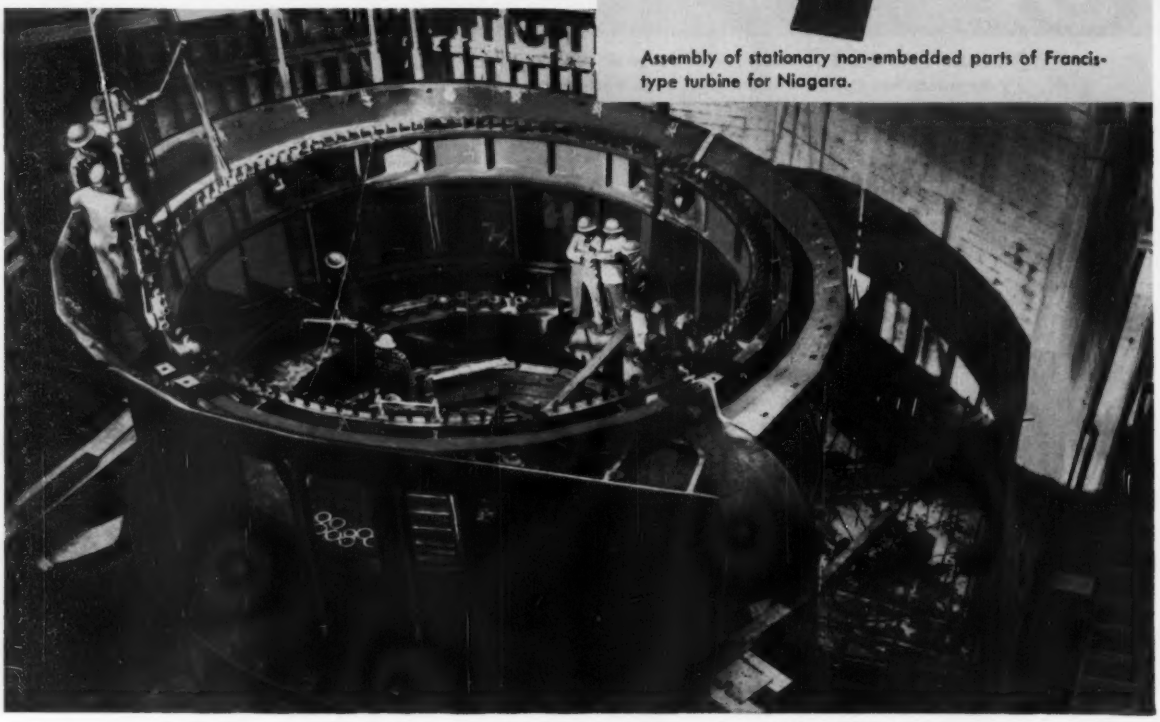
Scheduled to go into operation next February, the huge main generating plant is a 2,000,000 kw installation that will serve New York, Pennsylvania and Ohio.

Niagara is yet another in the long list of important hydroelectric operations throughout the world—The Dalles Dam, Garrison Dam, St. Lawrence Power Project, to mention only a few of the more recent—that owe their efficiency to B-L-H's 130 years' experience in designing and building hydraulic turbine equipment.

In addition to all four basic types of turbines—impulse, Kaplan, Francis and propeller—B-L-H manufactures governors, surge suppressors, valves, special pumps, and other accessory equipment. For more information and a free copy of our new illustrated Turbine Bulletin 1002, write B-L-H Corporation, Philadelphia 42, Pa., or Pelton Division (B-L-H), 2929 Nineteenth St., San Francisco 10, Calif.



Assembly of stationary non-embedded parts of Francis-type turbine for Niagara.



Turbine stay ring is positioned on pedestals in Unit #1—built by B-L-H—at Niagara Power Project's main generating plant. *Photo courtesy Power Authority of the State of New York.*

BALDWIN · LIMA · HAMILTON

Industrial Equipment Division · Philadelphia 42, Pa.

YOU GET

LONG-LASTING PROTECTION FOR YOUR OVERHEAD SYSTEM

with

BLACKBURN *Grounding* DEVICES

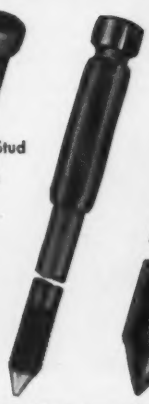
Type GTC 1
One plate tower ground clamp

Type GTC 2
Two plate tower ground clamp

Steel Driving Stud
for Sectional Ground Rods

Type GG
Ground Rod Clamp
Socket set screw

Copper Alloy Coupling
for Sectional Ground Rods



Copper Bonded Sectional Ground Rods

Copper Bonded Regular Ground Rods

Type GGH
Ground Rod Clamp
Square head bolt

Type B
Budget Line Ground Rod Clamp
Square head bolt

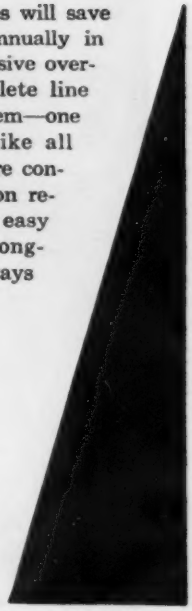
Type GP 100
Electrolytic Copper Pole Bottom Plates
7½", 10", 14" dia.

Copper Bonded Pigtail

Type GUV
U-bolt ground clamp parallel or 90°

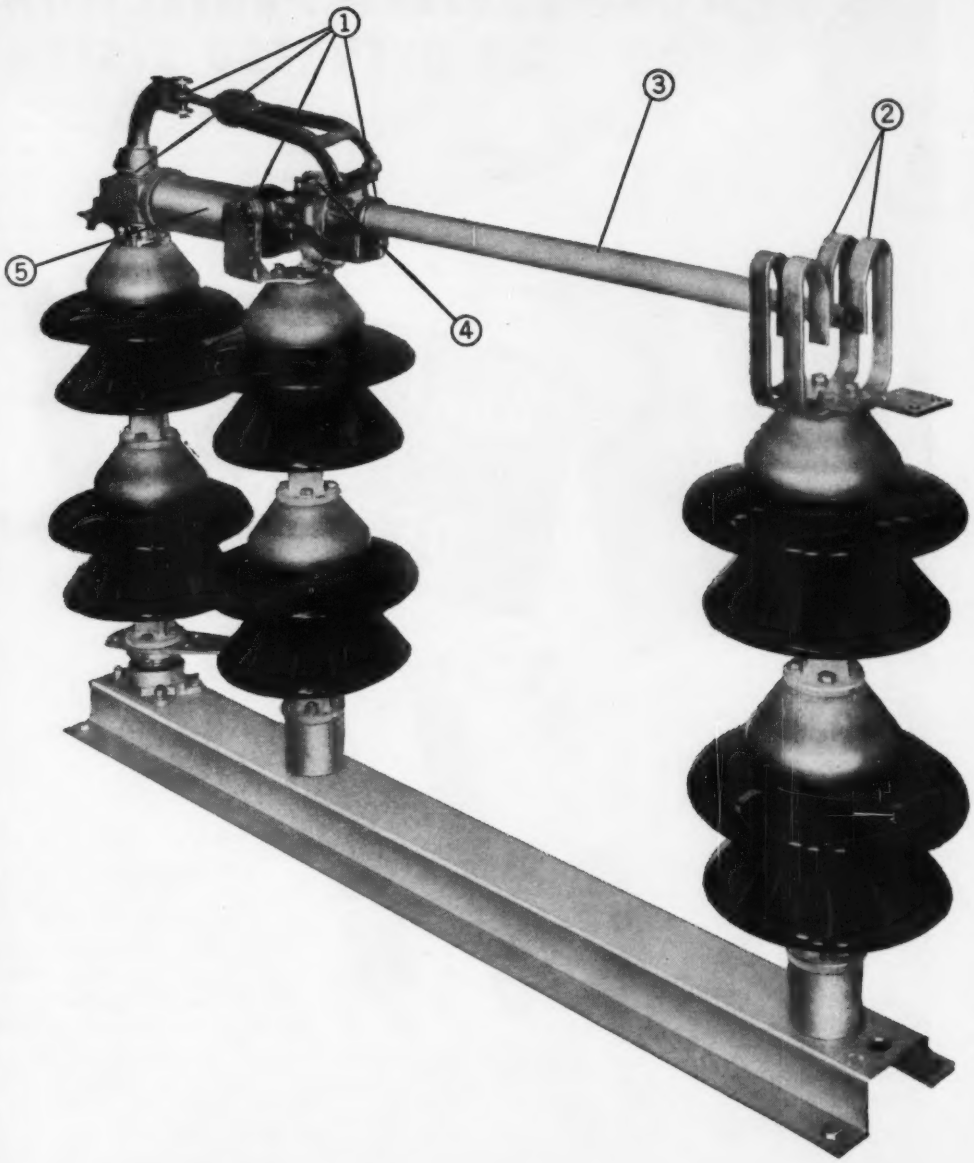
Blackburn grounding devices will save you thousands of dollars annually in preventing burnouts of expensive overhead equipment. This complete line simplifies your stocking problem—one source for all your needs. Like all BLACKBURN products they are constructed of high-strength corrosion resistant materials—designed for easy installation and engineered for long-lasting, trouble-free grounding. Always specify BLACKBURN.

Available Through Electrical Wholesalers Everywhere



JASPER BLACKBURN CORPORATION

ST. LOUIS 14, MO., WYdown 3-9430
1525 WOODSON RD.


1
2
3
4
5

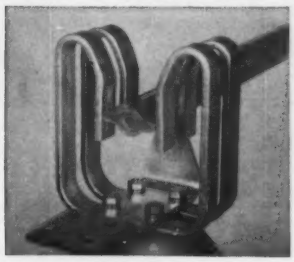
COMPLETELY NEW WESTINGHOUSE V-2 SWITCH PROVIDES TOP PERFORMANCE UNDER TOUGHEST OPERATING CONDITIONS

Another new air break switch? The Westinghouse V-2 air break switch is that—and more! Based on 18 years of continued development on the pace-setting "V" switch, the new V-2 switch is designed functionally to give superior, reliable performance under toughest operating conditions. Here's why:

1. **Teflon-coated bushings** on all live-side bearings assure long life, low-friction operation unhampered by corrosion. Teflon-coated ball-and-socket joint between operating lever and blade lever gives smoother operation, longer life.
2. **Reverse-loop break jaw** is one piece, made of high-conductivity zirconium copper.
3. **One-piece, high-conductivity blade** with form-hardened contact tip.
4. **New enclosure** completely protects solid hinge bridging contact . . . yet bridge is easily removed for inspection. Adjustable joint in blade actuating linkage is also completely enclosed and protected.
5. **Counterbalancing mechanism** is enclosed in horizontal, vertical and underhung mountings. Mechanism rides on teflon rollers for longer life, lower operating effort.

The new V-2 switch retains many of the outstanding mechanical characteristics of the pioneering "V" design—rotating insulator bearing recessed in base; universal operating lever on driven pole; and the ability to function positively, safely under adverse atmospheric conditions, including ice.

FOR MORE DETAILS on the new Westinghouse V-2 switch, contact your nearest Westinghouse sales engineer or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. J-60997-R



IMPROVED ELECTRICAL CHARACTERISTICS: The V-2 features a new design, single-piece break jaw of zirconium copper which ups break jaw conductivity to over 90 percent, cuts operating effort. Built-in silver inserts give longer life, corrosion-free contacting. And the reverse-loop break jaw shape, plus positive blade and blade stop coordination, eliminates contact burning under fault conditions.

WESTINGHOUSE PIONEERED SHUNT ELIMINATION with the solid hinge-end bridging contact which is now completely enclosed and protected, yet provides easy accessibility for inspection.

YOU CAN BE SURE...IF IT'S Westinghouse

TUNE IN WESTINGHOUSE-CBS TV-RADIO COVERAGE, PRESIDENTIAL CONVENTIONS, JULY 10-29

New Jetting Tool To Clean Tube Bundles Saves Thousands Of Dollars

The new high-pressure hydraulic tool, shown above, is currently saving thousands of dollars for companies in the refining, chemical, and petrochemical industries. It is the jetting tool developed by Dowell to remove deposits from heat exchanger tube bundles.

Previous methods of cleaning these bundles have been costly, time-consuming and often inadequate. Many times bundles had to be replaced completely because of the lack of a suitable cleaning method.

This new tool has a remarkable record of thorough, fast cleaning. For example, a slurry reboiler exchanger bundle, three feet in diameter and 16 feet long, was fouled with deposits of coke and asphalt. After being jetted from only one side, the bundle was thoroughly clean. Time required: less than one hour.

The tool holds the bundle in place for cleaning and has flanged rollers for rotation. The jet-head is manipulated automatically so that all tube spaces are covered. The jetted liquid can be either water or chemical solvents.

The new Dow Industrial Service Division will continue to offer the service which was formerly provided through the Dowell Division. For engineered recommendations to solve your cleaning problems contact the field office nearest you, or write Dow Industrial Service, 20575 Center Ridge Road, Cleveland 16, Ohio.

DOW INDUSTRIAL SERVICE

DIVISION OF THE DOW CHEMICAL COMPANY

DOW

All done by sun-down

New O-B pothead saves enough time to get oil-filled cable under permanent seal in a working day

It might sound like splitting hairs to talk a few hours' time saving on a job as expensive as building a high voltage pothead. Yet, it's a fact, these few hours are very valuable!

Modern O-B capacitor-graded potheads have many components that are factory assembled - - many more that are considerably simplified. The construction crew can leave the job at quitting time with an O-B pothead completed.

This means that the oil-filled cable need not be under temporary seal over night. Risk of exposure is cut materially. Ask your cable man what it means to clean up a pothead in a day's time, and have it under permanent seal by sun-down. Here is where the time saving of O-B potheads really pays off.

This is just one of many features of O-B's new terminal equipment. It will pay you to know the whole story before you plan any new construction. You can get it from your O-B representative or by writing us direct.

OHIO BRASS COMPANY, MANSFIELD, OHIO

Ohio Brass (B) HOLAN

PORCELAIN INSULATORS • LINE HARDWARE • CAPACITORS • LIGHTNING ARRESTERS
BUSHINGS • HOLAN TRUCK-MOUNTED POWER DEVICES AND BODIES • BRONZE VALVES

100007-H

Everything Is Peaches...

Atlanta, the state capital of Georgia, is the principal railway center of the South. This city of skyscrapers and nationally-known Peachtree Street is served by 15 lines of eight railways, and owes its existence and development to transportation.

Railways and electric power signify growth in any city, and Kerite has served railroads and electric utilities everywhere with cable that has been a standard of dependability since 1854. Kerite has grown with these and other industries through the years. *When tomorrow's problems occur—Kerite will already be ahead of them.*

KERITE CABLE

it's the **KERITE** *that makes the difference*

General Office—30 Church Street, New York 7, N. Y.

SALES OFFICES:
Albuquerque, Ardmore, Pa., Birmingham, Boston, Chicago, Cleveland, Denver, Glendale, Cal., Houston, Lake Wales, Fla., Portland, Ore., St. Louis, Salt Lake City, San Francisco, Seattle

Editorial Comment

MAY 30, 1960

Small Systems Show Mature Approach

The spectrum of electric utility operations is broad indeed. The gap between the vast operations of the Pacific Gas & Electric Co and the 45 meters served by the Kenai Lake Electric Association in Moose Pass, Alaska, is equivalent to that between the Great Atlantic & Pacific Tea Co and a delicatessen.

The Kenai Lake co-op is cited only because it had the fewest customers of any operating utility listed in McGraw-Hill's Directory of Electric Utilities for 1959. It is representative, however, of an extremely numerous class. No examination of the utility industry can be considered complete without a survey of the problems and accomplishments of this group.

Most small systems had their origins in, and still operate in, rural or small-city service. Most were originally dedicated to area coverage, so long-term planning had to take a back seat in many cases. Managers often grew up with their systems and learned while building them.

This era is past. Throughout the United States, customers are demanding, and have a right to expect, a uniform standard of service reliability. This places heavy burdens on the managers of small systems. But two things became evident as we prepared this issue's special report on **small systems engineering,** which begins on page 33:

- There are far more problems common to large and small systems than differences between them. As with many industries, the electric utility industry has become a labyrinth of specialization, no matter what the size of the operating unit. This develops sophisticated problems demanding managerial excellence.
- Managers of small systems are rapidly acquiring the necessary skills to keep their systems up to date. The field is marked by a willingness to experiment with the latest and best methods. It's a healthy sign for the entire industry.

Creeping Inflation and Reappearing Apathy

The dull glaze of apathy has reappeared in the public eye. This time it's obscuring the subject of creeping inflation's long-range effects.

Perhaps this is due to the current slowdown in the cost-of-living index's rise. Maybe a possible federal budgetary surplus is a factor.

There is a human tendency to avoid painful subjects if they are not kept prominently displayed. And the public press and public speakers have neglected this display of late.

But have things really changed on the inflationary front in the past few years? Is the danger of creeping inflation behind us for good?

Houston Lighting & Power Co doesn't think so. It is sufficiently concerned to undertake a one-company public campaign to keep the issue alive in its service area.

HL&P has published a series of six full-page newspaper ads, focusing the full beam of publicity on inflation. The ads present grocery-basket examples, and should have excellent impact.

There's no denying that regulated utilities have much at stake in holding the line on inflation. They fight it as a matter of necessity.

In attacking inflation publicly, HL&P is contributing significantly to civic responsibility. Other utilities might well re-examine their position on inflation and assess whether they might not step up their publicity attack at this time.

Federal Power Agencies' Budgets Cut

House Appropriations Committee hits four federal power agencies—TVA, Bonneville, Southwestern Power Administration, and AEC—in the "pocket nerve" as it votes out fiscal '61 bill. Burns Creek, Glen Canyon affected

Four of the federal government's power-producing agencies—Tennessee Valley Authority, Bonneville Power Administration, Southwestern Power Administration, and Atomic Energy Commission—were hit by the House Appropriations Committee last week in voting out next year's Appropriations Bill.

TVA was spanked by the appropriations group for failure to sell power to several local municipalities and "distribution sources" in its area. The committee said that these systems had written in, claiming they were legally entitled to TVA power "in view of the territorial limitation on the TVA now prevailing," and the committee urged the Authority to reconsider its denials of these power applications.

Bonneville Power Administration was cut $225,000, to $29,470,000 (construction funds unchanged at $18,720,000); and Southwestern Power Administration was cut $50,000, to $2,525,000 (construction funds unchanged at $1,325,000).

Atomic Energy Commission's budget was set at $2,586,060,000—a cut of $89,240,000. Plant acquisition and construction funds were sliced $7-million from the White House budget, to $208,500,000; and no new funds were included for the "Round Two" co-op, municipal power reactor program.

Public Works Budget Sliced

Over-all, the huge Public Works Appropriation Bill for fiscal year 1961 was cut $159.2-million below White House requests to $3.842-billion. This is $31.9-million less than the actual appropriation for the year just ending.

The bill went immediately to the floor of the House of Representatives for action. Only a few changes are expected.

The committee's version deletes four new construction starts asked by the White House, and adds one new start; none involves power.

The President's request for the Corps of Engineers was cut $45,550,000, to $891,198,100; the Corps' construction appropriation was reduced $48,196,700, to $662,622,300. Several other minor increases in the Engineers' budget account for the smaller total reduction than what was pared from the construction money.

The Bureau of Reclamation's total budget was cut $23,951,295, to $277,362,705; the Bureau's construction funds were sliced $7,505,120, to $166,444,880.

Unchanged from the President's requests were the committee's recommendations for the Southeastern Power Administration, $800,000 (no construction), and TVA, $20,520,000 (including $4-million to start work on the Melton Hill hydro power dam).

No New Burns Creek Funds

No new funds were approved for the still-unauthorized Burns Creek hydro power project (90,000 kw) in Idaho. A $487,500 appropriation from the present fiscal budget remains available for Burns Creek, if it is authorized by the House Interior Committee.

The $24,415,000 requested by President Eisenhower for Missouri River transmission lines is unchanged by the committee. However, the appropriations group noted that $2,380,000 of this amount would go for lines between Sioux City-Creston and Sioux City-Spencer, Iowa, and there is a controversy going on as to where the lines should be located. The committee called for an immediate solution "in the manner least costly to the federal government."

Upper Colorado transmission line funds were increased by $4.8 million, to $5,318,000. This was done—following Interior Department's report on the Upper Colorado River project's power marketing area—to permit immediate construction of "backbone" transmission lines between Glen Canyon and Curecanti Dams, and between Flaming Gorge Dam and Oak Creek. The committee said that all interested parties who testified before it—federal, private and preference groups—agreed that these particular lines should be built by the federal government.

Glen Canyon Funds Also Cut

Glen Canyon funds were cut $3.5 million, to $23,535,000, after the committee agreed to drop a special program (estimated cost, $20 million) to prevent Glen Canyon waters from damaging Rainbow Bridge National Monument.

The committee held that the program wasn't necessary—that the Rainbow Bridge National Monument will be safe, regardless.

Pump-back reservoirs were the subject of a special committee request: that the Secretary of Interior report back on the possibility and cost of a major study of how pump-back facilities might be used to increase power production at existing federal power dams.

The appropriations committee also called on Reclamation and the Engineers to come up with a uniform pattern in developing basic recreation facilities at federal multi-purpose dams. The committee noted that both agencies have shown a "growing tendency . . . to expand the definition of minimum facilities" for recreation, public health and safety at these dams. The group also called on other Congressional committees to study the problem, and it ordered both the Corps and the Bureau to report back, ahead of the 1962 Appropriations Bill, on how they are handling recreation facilities.

"It is the committee's opinion that . . . income from the use of recreational areas and facilities should be at least sufficient to carry the federal cost of construction and management of the areas," the group added.

The Stock Option Plan—How Middle South and SEC View It

I RETENTION AND RECRUITMENT OF TOP PEOPLE—

MIDDLE SOUTH: Competitive pressures require it to have a policy of offering stock options for the "attraction and retention by Middle South System of capable executives and the recruitment of capable young men."

SEC: Middle South can show only one case of where a top employee left citing as one of his reasons lack of a stock option program.

II EMPLOYEE INCENTIVE—

MIDDLE SOUTH: It is at a competitive disadvantage, that other electric utility firms not subject to the holding company law have stock option plans to induce top officials to perform better.

SEC: Just the opposite appears to be the case. Taking the record of 12 electric utility companies cited by Middle South as having stock options, SEC says the percentage increase in Middle South's earnings outstripped the average earnings of the 12 firms in recent years.

III CONGRESSIONAL POLICY—

MIDDLE SOUTH: It was the intent of Congress in amending the Internal Revenue Code in 1950 and in 1954 to foster a policy of encouraging stock options, and that registered holding companies were meant to be included in such declared policy.

SEC: This is a "startling proposition," arguing in effect that Congress in amending the Internal Revenue Code also amended the Holding Company Act.

IV INFRINGEMENT ON CORPORATE RIGHTS—

MIDDLE SOUTH: The options proposed are not securities covered by the 1935 Act because they are non-transferable. To deny Middle South the right to issue options is to deny the company its management prerogatives.

SEC: The Act makes no distinction between a transferable and non-transferable security. Middle South's argument is an attempt to overcome the "clear language of the Act."

SEC Bars Middle South Stock Option

Middle South Utilities, Inc, has lost the first round in its attempts to be the first registered electric utility holding company to win the right to issue stock options to executives.

The company has formally petitioned the Securities and Exchange Commission for permission to distribute options for perhaps as many as 120,000 common shares among key executives.

The Middle South request provides a formal test of the right of the SEC to bar option programs among registered public utility holding companies. Middle South argued that the option program was necessary to meet competitive pressures in keeping high caliber people.

But SEC staff lawyers in a 71-page brief issued last week swept aside every argument marshalled by the company. The brief contended that in general options are unlawful for registered holding companies.

In their summation, the SEC lawyers also took a swipe at many of the most commonly advanced arguments in favor of option programs, such as they provide an incentive for more diligent work by top corporate officers.

The staff brief is not the final word on the matter, however. SEC commissioners have taken the case for consideration and will hand down a decision later.

Middle South posed the issue of the right of holding companies to issue stock options in a brief submitted last fall asking for permission to issue 60,000 stock options. Since then, the company has split its stock two for one and twice as many stock options could now be involved.

The heart of the case turns on whether the 1935 Holding Company Act covering public utilities invests the commission with the authority to deny issuance of options.

The 1935 act contains no express prohibition against it. But the SEC has always maintained that the power was granted "in reverse"—by the fact that Congress did not specifically state that options are permissible security issues such as common stocks and first mortgage bonds. In addition, the commission says it was given discretionary authority to bar options by the language in the act requiring holding company security issues to be first approved by SEC.

The 1935 act covers only public utility holding companies engaged in interstate dealings. Middle South complained that this put it at a disadvantage with other electric power companies and with public utility holding companies exempted because of operating wholly within a state or in immediately adjacent areas within another state.

By its action, Middle South is forcing SEC to spell out new law on the whole issue of holding company stock issues. Up until now, SEC has never been forced to take a formal stand. In several previous instances, the commission had relied on private persuasion to dissuade holding companies from submitting option plans.

The SEC attorneys argue further stock options are "not reasonably adapted" to the security structure of Middle South because of the large number of other securities which the company has outstanding. This, according to the legal brief, would make it difficult or impossible for investors to assess the real worth of the company's common stock.

A Middle South executive told *Electrical World* that a reply brief to the SEC staff report will definitely be filed, but he did not know when. He also could not say whether the company will go to court in the event SEC rules against the stock option plan.

Europe Looks to 400 Kv

European engineers discuss experiences with 400-kv systems to determine difficulties involved in interconnecting various sized regions. Represented were 16 countries

J. H. M. SYKES, Engineering Overseas Correspondent, Electrical World, Bedford, England

The next step in *regional* interconnection in Western Europe is likely to be a voltage step-up to 400 kv. That was the conclusion reached after a one-day conference held in Brussels, Belgium, recently.

The conference, called by the Association des Ingenieurs Electriciens diplomes par L'Institute Electrotechnique Montefiore ("A.I.M."), attracted power transmission engineers from West Germany, Australia, Canada, Denmark, Spain, France, Luxembourg, Britain, Italy, Japan, Holland, Portugal, United Arab Republic, Sweden, Switzerland, and the USSR.

Basic assumptions made were these. Networks at the 275-to-500-kv level have been established, up to now, for two purposes:

- To transmit large blocks of power over long distances.
- To interconnect over long distances two or more existing networks to gain load-diversity benefits and co-ordinate hydro and thermal power production.

Superimposing EHV Discussed

There exists a further possible category of network—a higher voltage system superimposed on an existing 110-kv to 220-kv network, to reduce short circuit duties on existing switchgear.

With these assumptions in mind, and obviously with Belgian electrical conditions very much in view, the conference centered on this third category, the 400-kv regional interconnection.

As a background to the use of the 400-kv level for any purpose, those now using it spoke of their experience. The oldest 400-kv network is in Sweden. Gunnar Jancke, Chief Engineer, Swedish State Power Board, said he favoured acceptance of a relatively high short circuit current of 20,000 amp in systems of 132 kv, 220 kv and 400 kv, extending to 35,000 amp within the next 20 years, while 50,000 amp was possible. Reactors to limit short-circuit current were not regarded with favour, and were only used as temporary expedients.

Swedish practice favoured single-circuit lines, and a small number of high-capacity substations. Operating experience over nearly ten years had shown that most 400-kv faults were single-phase, and rapid auto-reclosing had been very successful. Most faults in any case were of a transient nature.

Russian Experience Related

V. V. Burgsdorf, USSR, said Russian engineers also preferred single-circuit 400-kv lines. Faults had only averaged 0.2 per 100-km (62 miles) per year. Performance had been better than anticipated.

The Russians are actively proceeding with the conversion of some existing 400-kv lines to 500 kv, and 1,000 kv is under discussion. The original design was based on an overvoltage of three times the working voltage. Considerable benefits have accrued by reducing this figure to 2.5, by better control of internal overvoltages, he said.

Limitation of short circuit rating to about 20,000 amp on the 110/220-kv networks was accomplished by sectionalizing.

Two other present users of 400-kv systems—France and Western Germany—were represented in the papers. Dr I. G. V. Boll, of Deutsche Verbundgesellschaft, said that 20,000 to 25,000-amp, three-phase short circuit current was the maximum acceptable on the existing 110/220-kv networks, and this was a reason why a higher voltage had been used in West Germany.

M. Cahen, of Electricite de France, on the other hand, said that the short circuit limitation was not the prime reason for adopting the proposed regional ring at 400 kv round Paris (and later another around Lyons), although he too agreed that 20,000 to 25,000-amp short circuit current was high enough.

These papers showed that 400-kv is a well-proved voltage level, and that most technical problems, including radio interference had been solved. But the question remained —was it suitable, economically and technically, for regional interconnection? In a small country like Belgium, was 400-kv necessary, since no long distance energy hauls were involved?

One answer came from Britain. H. B. Dreyfus, of the Central Electricity Generating Board, and F. J. Lane, of Preece, Cardew and Rider, (consulting engineers) between them said that if the limitation of short circuit current was one reason for using a higher voltage, it was not one that they would advocate. Lane, in particular, said that when the 275-kv British supergrid was designed the attitude taken was that the system design and layout should limit the short circuit current, and that it would be wrong to allow the short circuit current to rise and then to construct equipment to meet the rise, since this would set up a cumulative effect with no limit. They had been successful in limiting the short circuit current to 13,000 amp —much lower figures than those mentioned by Continental engineers.

Gradual Step-up Recommended

British objections to high short circuit currents included shock to the system at time of fault, severity of possible damage to equipment, possibility of dangerous ground potentials, and interference with adjacent communication systems. Methods had been found in Britain for reducing short circuit current, mainly by sectionalizing, and could be applied elsewhere. It was clear that to advance from, say 150-kv to 400-kv for this reason alone might be an uneconomic step.

The conference chairman, Professor Fourmarier, of A.I.M., summed up by saying that Belgium accepts the view that a 20,000-amp short circuit level is high enough, but feels that the Swedish figures are too high. Experience from Russia, Sweden and Britain showed that Belgium's present 150-kv network would inevitably expand, over the next few years, to an extent which would render it very difficult, if not impossible, to keep the short circuit current down to that limit.

Anti-Trust Indictments: Seven More...

. . . are brought against electrical manufacturers by grand jury. Transformers, power switching equipment, switchgear and isolated phase bus covered. Sentences postponed

Seven more anti-trust indictments were handed down by Philadelphia Grand Jury in past two weeks.

The four most recent indictments, issued May 25, cover transformers. Distribution, power, instrument and network units are involved. On May 18, three other indictments were issued covering power switching equipment, navy and marine switchgear, and isolated phase bus. Civil complaints were entered with each of the seven indictments, all of which charge price-fixing. Four also charge allocation of business and bid-rigging.

At the time of the May 25 indictments, Judge J. Cullen Ganey "postponed indefinitely" the sentencing of two companies and three individuals who had pleaded guilty on earlier indictments. Sentencing is now expected after the trials of those pleading not guilty. These will begin probably in September.

There are now three grand juries investigating. The one that handed the transformer indictments has one more phase to complete; this should be done by June 15. It is not known when the other two juries will finish their work; however, one jury was only recently brought into the probe.

Distribution Transformers

The following companies and individuals were named in the distribution transformer indictments:

General Electric Co and M. A. deFerranti, general manager, distribution transformer dept; Allis-Chalmers Mfg Co; Kuhlman Electric Co and Joel Watkins, vice president and general manager of its transformer division; Wagner Electric Co; Westinghouse Electric Corp and Gordon Hurlbert, manager of its distribution transformer dept; McGraw-Edison and W. R. Swoish, sales manager of McG-E's Pennsylvania Transformer Division; and A. R. Waehner, direct transformer sales, Line Material Industries.

Average annual business done by the defendants in the product lines covered by the indictments is reported to be $220 million.

The indictment charges that the defendants fixed and maintained prices beginning as early as 1956.

Power Transformers

In the power transformer (other than network transformers) indictment, defendants named are:

Westinghouse Electric Corp and J. H. Chiles Jr, vice president and division manager and R. N. McCollom, manager, both in transformer division; Allis-Chalmers and J. W. McMullen, vice president and general manager, power equipment division; General Electric and W. S. Ginn, vp and general manager of the transformer division, along with J. W. Seaman, and R. W. Smith, also in the transformer division; Moloney Electric Co; Wagner Electric Co; and McGraw-Edison, along with W. R. Swoish of the Pennsylvania Transformer Division.

Indictment claims business in these product lines was $210 million, and that defendants conspired to fix and maintain prices, to allocate business and submit rigged bids to government agencies, electric utility and industrial companies. Alleged allocation: Westinghouse—30%, A-C—15%, GE—30%, McGraw-Ed — 8%, Moloney — 10%, and Wagner—5%.

Instrument Transformers

The instrument transformer indictment names Allis-Chalmers, GE and Westinghouse as defendants, and Sangamo Electric Co as a co-conspirator. Defendants were said to do an average annual business of $16 million in this product line. They are charged with conspiring to fix and maintain prices.

Network Transformers

Defendants in network transformer indictments are: McGraw-Edison, Allis-Chalmers, GE, Moloney, Wagner and Westinghouse. Average annual business was put at $15 million. Defendants were charged with conspiring to fix and maintain prices.

Bid rigging, price fixing, and allocation of business in sales of power switchgear, navy and marine switchgear, and isolated phase bus were also charged in three new antitrust indictments against the electrical manufacturers.

Three civil complaints accompanying the indictments carry cease and desist orders, ask for new and independent prices and ask for the defendants to notify customers of the results of the court order.

Following are defendants and co-conspirators (but not defendants) named in the indictments:

Power Switching Equipment

Federal Pacific Electric Co; General Electric Co and G. L. Roark, manager of marketing, high voltage switchgear; I-T-E Circuit Breaker Co and H. K. Wilcox, Greensburg division manager; Joslyn Mfg & Supply; H. K. Porter Co and John Romano, general sales manager of Delta-Star Electric Div; Schwager-Wood and W. Maxwell Wood, secretary-treasurer; Southern States Equipment Corp and J. E. Cordell, vice president of sales; Westinghouse Electric Corp and W. T. Pyle, sales manager of switchgear devices section, Assembled Switchgear & Devices Dept.

"Co-conspirators" named are A. B. Chance Co; Cole Electric Co; Hubbard & Co; McGraw-Edison Co; MEMCO Engineering & Mfg Co; Royal Electric Mfg Co, and USCO Power Equipment Corp.

Isolated Phase Bus

H. K. Porter Co, General Electric Co, I-T-E Circuit Breaker Co, and Westinghouse Electric Corp.

Navy and Marine Switchgear

I-T-E Circuit Breaker Co, General Electric Co, and Westinghouse Electric Corp.

The indictments define "power Switching equipment" as air-break switches rated above 600 v and accessories, and "navy and marine switchgear" as assemblies of 600 v or below.

NEW AND OLD PRESIDENTS talk about the office. Frank Lietz (l), incoming, gets advice from Warren Widenhofer, outgoing

ADVERTISING INTERESTS are fighting the tax battle in Washington, says AFA's C. James Proud

PUAA Talks About Ad Tax Problems

Censorship by taxation is primary discussion subject at utility advertising men's gathering in New York City

Utility company advertising personnel have been placed on the front line of defense against the insidious "censorship by taxation" that is becoming a popular pastime of local, state and federal government revenue seekers. That the ad men are well aware of this was obvious at the 39th Annual Convention of the Public Utilities Advertising Assn in New York May 11-13.

Besides the now famous attempts to hit institutional advertising through the Internal Revenue Code, utilities as well as other businesses face some local and state government attempts to levy excise taxes on advertising.

In effect, according to C. James Proud, president of the Advertising Federation of America, local, state, and federal governments are nibbling away at the right of freedom of speech through taxation. He said:

"We must guard against this erosion of the right or we will have only a shell of a principle left."

Outright censorship is not as much of a danger, according to Proud, as taxation, because censorship is obvious and would receive strong resistance. Censorship by taxation, on the other hand, is more subtle. And the tax devices used are in effect 50% censorship.

"Remember that the First Amendment does not give us only half a right to speak," he said.

Proud's organization is maintaining a Washington office to keep in close touch with developments in legislation. He suggested that other action should be taken at the "grass roots" level to get state legislation upholding the right to advertise.

At least one frustrating thought offered by Proud is that public education is a good tool to use against censorship of advertising—and this would probably fall under the classification of institutional advertising.

Arthur Barnett, managing director of the National Assn of Electric Companies, said the success of self-government depends on the people knowing enough to make a decision, which again leads back to institutional advertising—the utilities' best means of communication.

The outlook for the future of the perennial public-private power battle, according to Barnett, is not bright. Without enumerating specifics, Barnett said that 1961 will bring forth many problems and legislation that have been lying dormant.

One suggestion he offered to aid with dealings with Congress is to appreciate that the politician has something to say that utilities can well afford to listen to.

Advertising and public relations specialists in the utility industry were reminded of their responsibility to keep top management informed on latest developments in public opinion, measurement, media, and newest methods of dealing with public relations problems. He said:

"Do not expect top management to be conversant with the . . .

newest approaches to public relations problems without your help . . . it is up to you to sell public relations within your organizations.

"I believe that whether or not we Americans remain a free people in a free society depends in large measure on the strength of our economy. In turn, the future of the American economy depends on the ability of business management to make sound decisions based on all available information . . . the responsibility for providing management with the information . . . lies with you."

Advising utility advertising departments on how to make their ads more effective, Whit Hobbs, vice president, Batten, Barton, Durstine & Osborn, Inc, said: "Think, write, and sell in the singular; address someone special; don't talk to 'strangers.' When you aim high and speak low, you'll have fewer public 'futility' ads. Make your ads like a letter, only better."

Public attitudes create limits for any business enterprise, declared Dr Horace J. DePodwin, manager, Planning & Applied Research of Public Affairs Service at General Electric Co.

"Because men are motivated by what they know and what they feel, a utility must seek to create a corporate image that will influence them favorably," he said.

Such an image, he said, can influence the buying of products, the conduct of ordinary business, the attractiveness of investment in the company, the company's efforts to obtain rate increases and obtaining approval for construction work.

A FRIENDLY EXCHANGE after talks that pointed out the vicissitudes of their respective professions is enjoyed by William T. Brady (left), Consolidated Edison public relations veteran, and Gene Smith, well known 'New York Times' writer

Frank C. Lietz succeeds Warren W. Widenhofer as president. He is from Northern Illinois Gas Co, Bellwood, and Widenhofer is with Indiana & Michigan Electric Co, Fort Wayne.

Jack Fleming is first vice president, James W. Lumpp is second vice president, Wesley Blish, secretary, and Mead Schenck, treasurer.

EEI Sees Private Capacity Quadrupled by 1980

Investor-owned utilities will quadruple their generating capability by 1980 to 492 million kw. In order to do this, they will have to spend more than $143 billion on new construction.

These are two of the principal findings of a nation-wide, region-by-region study recently completed by Edison Electric Institute. Some of the study's findings have been submitted to Sen Robert Kerr's Select Committee on National Water Resources (EW, May 2, p 32), to help the committee determine the nation's future water needs.

The study produced capacity, investment, output and consumption figures for the next two decades, specifically for the years 1970 and 1980.

According to EEI Pres Allen S. King, "By 1970 the electric companies expect to double their power-producing capability, bringing the total to 263 million kw." To reach that level, said King, "will require about $52 billion in new construction."

King also predicted that per capita kwhr use in the US in 1970 is expected to be 7,555 and 11,800 by 1980. These figures are for the total US population, not merely for those served by the investor-owned utilities.

Output to Pass Trillion Kwhr

Sometime during the decade of the 60's total kwhr output in the US will cross the one trillion mark. By 1970, the study sees it at 1.2 trillion kwhr; by 1980, it should reach 2.3 trillion kwhr.

The study also makes a breakdown of types of generating facilities in 1970 and 1980. Said King: "In 1970 it is expected that steam will account for 225 million kw, hydro for 20 million and nuclear plants for eight million kw." About 9.8 million kw will come from other sources, which EEI defines as "firm capability from other than investor-owned systems and non-utility facilities, plus adjustments arising from interregional transfers."

In 1980 the study sees 417 million kw in steam and a reversal of the relative positions of hydro and nuclear power. A-power will account for 39 million kw and hydro for 25 million kw.

Other sources in 1980 will account for 11.8 million kw according to the study.

Utility Taps Water from Sand for Industrial Site

SITE (right foreground) on tidewater along the North Bend, Ore., was opened for development by container firm after PP&L brought fresh water from dunes

PP&L readies dry area for industrial development by meeting paper mill's requirements

Building to a distant-future, but promising industrial load has involved Pacific Power & Light Co in a six-year program of research and engineering. The payoff will begin to materialize next year when the Menasha Wooden Ware Co starts operations in its $5-million pulp and paper mill on the sand dunes north of Coos Bay, Ore.

Since the project was conceived, PP&L has engaged in activities only remotely touching on its normal business of supplying electric power. Now, however, with construction starting on the Menasha plant, the utility can begin to build a 4½-mile 115-kv line from North Bend across the bay.

Pilot Wells Now Flowing

To induce Menasha to build in the area, PP&L undertook to supply the prospective mill with its required 2.5-million gal of fresh water per day. The utility undertook this unusual task, and now for the past year 1.5-million gal of water have been flowing daily from three pilot wells placed by PP&L hydraulic engineers to prove their belief that the sand dunes are a vast storehouse of fresh water. Test operations and other research indicate a daily supply equivalent to 30 million gal in the dry, windswept dunes edging the Pacific.

The Coos Bay area is rich in timber, but poor in the water for utilizing its forest potential. Although the annual rainfall amounts to 65 in., the precipitous watersheds and craggy terrain make large storage projects impracticable. But investigation showed that the dunes were a natural reservoir, holding the water in underground pools kept at nearly constant level by filtration from rainfall and the ground water flowing from inland.

PP&L's investigations followed preliminary studies by the U.S. Geological Survey. Through stratigraphic core and well-drilling operations, PP&L engineers and geologists narrowed the possibilities to sand dunes stretching about 12 miles north of the bay, an area covering 13,000 acres.

Hydrologists and geologists of the PP&L research staff installed 170 piezometers to measure the water table and its fluctuations under seasonal conditions, and pumping from a small surface pond established that there was underground replenishment. Accordingly, a 36-in. dia and 200-ft long horizontal gallery of pervious concrete pipe was installed underground as a water collector. Pumping from the horizontal system, which was commenced in 1956, established flow dependability.

Late in 1957, a prototype pumping facility, using vertical wells designed to cope with sand, was installed, round-the-clock pumping from three wells producing an average 1.5-million gal daily. PP&L has a permit for taking up to 20,800 gal per min from 64 wells, three additional ones to be sunk this summer. Site preparation for the Menasha plant has proceeded along with construction of a causeway, and the paper mill, southwest Oregon's first, will be in operation in summer of 1961.

Besides Menasha, several other large lumber, plywood, and paper firms have extensive timber holdings on that part of the Oregon coast. Coos Bay is the world's largest lumber exporting port. The sawmills and plywood plants ringing it yield large quantities of unused wood fiber, Douglas fir residue alone being sufficient to provide for up to 1,000 tons a day of Kraft-type pulp and paper.

a special report

small systems engineering

LEON A. ALLEN, JR.
Middle Eastern Editor

There are no specialists on a small utility system, so managers must be flexible in planning and know when and where to get outside help

● The nation's small electric systems overshadow, in number if not in size of load and investment, the better-known mammoth public utilities. Some small systems generate their own power requirements; others buy bulk power from larger neighbors. All have a common problem—their managers and engineers face many of the woes that beset larger utilities but lack the staffs necessary to handle them.

What is a small system? There is, of course, no exact figure which can be said to delineate the boundary between small and large utility systems.

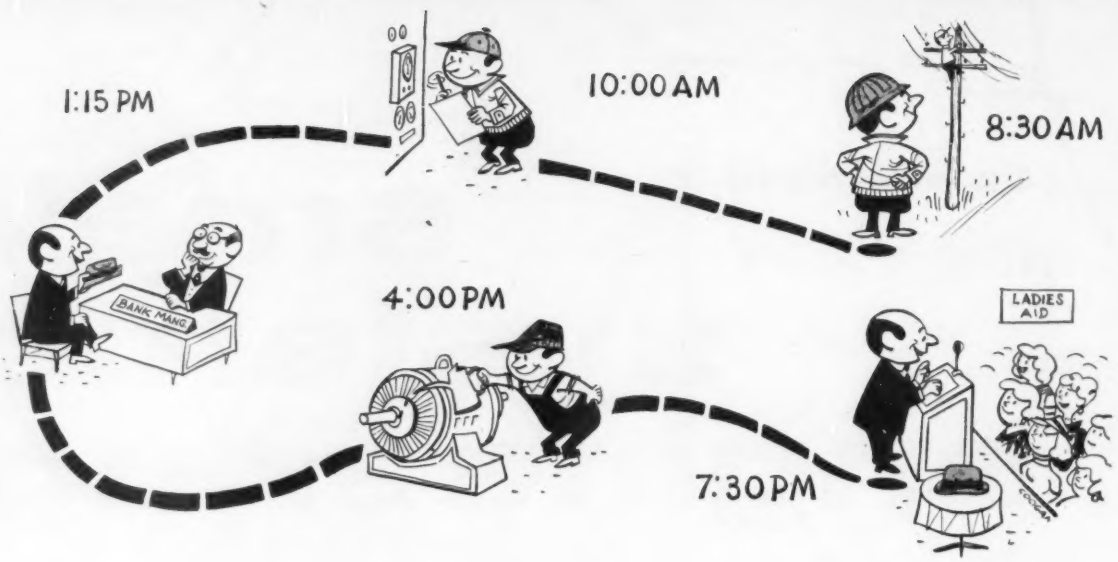
For the purposes of the report, Electrical World has arbitrarily selected 30,000 customers or less as indicating a small system. This, admittedly, is a crude definition.

In some ways, a small utility is basically a microcosm of a larger operation. Some problems may be less complex, but many will be harder to manage. This report, then, is a rundown of some of the problems especially aggravating to managers of small systems and some possible solutions.

The manager of the small utility must wear many hats. He must often be chief engineer, comptroller, construction foreman, sales man-

contents

Standardization Cuts Construction Costs ..... p 35
Job Training Reduces Accidents ..... p 36
Computers Help Plan System ..... p 37
Formulate Long and Short-Range Plans ..... p 40
Voltage Change Provides Operating Economies ..... p 42
Start-up Costs Assist Generation Scheduling ..... p 44



"the manager of a small utility wears many hats..."

ager, purchasing agent, system planner and public relations manager. Only fractional attention can be paid to each task, and size limitations prevent hiring specialized personnel to fill these slots.

Thus he must rely on consulting and association help more than his counterpart in a larger utility. The manager must continually decide at what point the small system needs outside help and where he must go to get it.

Personnel Problems Are Chronic

Personnel problems are always with the system manager. It isn't easy to induce highly-trained utility engineers to work in the limited confines of a small, often isolated system. Pay scales are usually lower than industry averages, and specialization cannot be encouraged because of the varied duties involved. Reliance on retained consultants then becomes almost mandatory.

Training of operating and construction employees is also difficult. Included in this report is an example of a state-wide linemen's training program which has met with great success. Training of this type has been invaluable in sharply cutting accident rates and encouraging safe, modern work procedures.

Training of generating plant personnel is even harder. Because of the smaller numbers of men involved, a full-scale training program is difficult to implement. The Rural Electrification Administration has conducted annual Generating Plant Operators Conferences which have been greeted enthusiastically, but many plant operators are still using methods of twenty years ago.

Here manufacturers can, and have been, helpful in instructing employees in the proper use of new equipment and, to a lesser degree, on existing equipment as well. No small system manager can afford to ignore the benefits of training available from various machinery and equipment manufacturers.

Buildings and facilities must not be forgotten. A new headquarters building represents a staggering financial outlay for a small utility. If the utility is municipally-owned, difficulties are multiplied by the inevitable competition for funds with other capital improvements planned by local authorities. If it is a cooperative venture, members may feel that the building must be flexible enough to be used as an assembly hall and for other purposes as well.

Record keeping varies from insufficient to voluminous. There are no pat formulae to tell each manager what records he should keep. But it is becoming more common to maintain records of service interruptions, locations of capitalized equipment and other records not often kept in the past. The advent of machine accounting—and this has come within the budget of many small systems—has simplified record keeping while simultaneously providing a greater source of information.

Computers Can Be Used

A more esoteric tool—the computer—can be used effectively by small systems, as pointed out on page 37. Indeed, many of the devices formerly used by only the largest utilities have become attractive to smaller systems on a cooperative basis. There is seldom any need for a small system operator to deny himself the use of the best available equipment.

Thus far we have listed only problems. These certainly exist, and they will be aggravated as the pressures of generation and transmission economy increase in the years ahead.

But, in addition, it must be pointed out that people served from small systems often obtain a degree of service reliability comparable to those served in our largest cities. So it is obvious that there are a great many small system managers who can successfully juggle many duties while providing quality service.

National Standards Provide Savings

Judicious use of appropriate national standards cuts costs for small utilities

J. E. O'BRIEN, Chief, Electric Engineering Division, Rural Electrification Administration, Washington, D. C.

● Materials, equipment and construction standards for utilities effect major economies and are an essential feature of all mass production techniques. Not only do standards reduce costs through production of equipment in large quantities, but they also permit economies by applying assembly line, mass production techniques to the construction of electric power lines.

Standardization produces additional benefits. It permits an orderly evaluation of performance of materials, equipment and structural designs. Furthermore, standard pole top arrangements have proven very helpful in times of emergency resulting from widespread snow, sleet and windstorms.

At such times the ability to effectively use line crews from neighboring systems and contractors' crews familiar with the type of construction of the affected system, and the ability of materials suppliers to quickly reinforce local stocks of standard items of equipment and materials, help to minimize the effects of the damage. Standardization is an important element in any utility or area disaster plan.

Groups Develop Standards

National standards are usually developed by technical societies, trade organizations, or user groups. The overall national standardizing agency is the American Standards Association, which provides a mechanism for developing and establishing standards responsive to the consensus of all interested groups concerned with any particular standard. The standards work of such organizations is carried out by experts in each of the specialized fields and a continuous evaluation of standardization needs and the associated modifications and revisions required to keep standards up to date is carried on.

A large power system has a specialized staff to evaluate its standards needs and to develop its own standards. It may also be a big enough customer to obtain "volume" prices on equipment and materials meeting its own standards.

The staff of a small system might not have the ability to develop and maintain a comprehensive standardization program. To establish a staff for this purpose might be so costly as to outweigh the benefits of the standardization program. As a customer, the individual small system must rely on others who use exactly the same items to help it obtain "volume" prices.

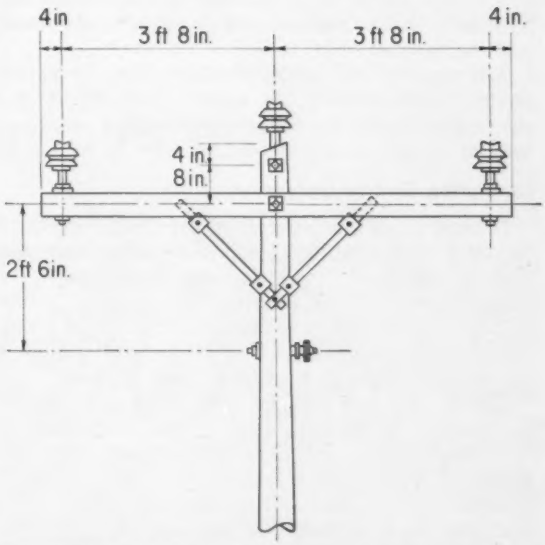
Several solutions are available. The small power system can use national standards as the basis for its standardization program. A second solution is for the small power system to use the standards of a neighboring system with which it may have a close relationship. A third is for several systems having similar interests to band together and jointly develop and administer a standardization program.

The latter is the arrangement used by the Rural Electrification Administration in carrying out a standardization program in connection with some 1,000 associated rural electric power systems. REA has developed standard construction drawings for transmission and distribution lines and an associated "List of Materials Acceptable for Use on Systems of REA Electrification Borrowers." In addition, standards for major steam plant equipment and various items of transmission and distribution equipment and materials have been available.

There are many advantages in using national standards either directly or through the medium of some group of users. National standards are developed systematically and are subject to continual review and revision to reflect the latest manufacturing advances and operating experiences. In contrast, an isolated set of standards may become obsolete quickly.

General acceptance of national standards permits the high volume production of standard items that keep costs down. Deviations from national standards add more types of equipment to a list which already has too many types and ratings, reducing the long-range benefits of standardization. In fact, deviation from any standard erodes the foundation of the whole standardization structure, and should be examined closely before the deviation is made.

The operator of a small electric utility has access to a wealth of standards resource material. By judicious use of these resources he can obtain the benefits of standardization at reasonable cost.



CONSTRUCTION STANDARDS are mandatory for any well-managed small system. This example is from REA standards

Job Training Helps Reduce Line Accidents

Program of itinerant instructors has reduced fatalities and resulted in savings in insurance for Illinois rural electric cooperatives

HOT LINE TRAINING provides for one-week instruction period each year for five years. Many operating systems now have several crews who work exclusively on hot lines

A. E. BECKER, Manager, Association of Illinois Electric Cooperatives, Springfield, Ill.

● The work and responsibility of the itinerant instructor in recognizing and meeting problems involved in training linemen in correct procedures cannot be overestimated. He becomes the key person in carrying out training activities which will help hold the accident rate to a minimum.

His leadership not only contributes to a low accident rate, but it also inspires employees to improve themselves as linemen. He assumes the responsibility of seeing that these employees receive instruction in the latest methods of performing a particular job.

Experience in the states using this program has indicated that significant savings can result. Since Illinois started the program in 1941, reduced premiums on compensation insurance rates alone save between $3.00 and $4.00 per $100 of payroll for all outside employees. This saving more than pays for the state's training program.

Job training and safety programs now cover 983 electric cooperatives in 36 states. Over 20,000 outside employees of the cooperatives receive continuous training in safe work methods.

Committee Directs Operation

In most states this program is given under the direction of a state committee composed of three managers, three directors and three line superintendents. This group adopts policies, employs job training instructors and collects funds to operate the program for the participating cooperatives. At the present time there are 58 job training instructors in these 36 states.

Illinois' first job training and safety program was inaugurated on May 1, 1941. The cooperation of the Trade and Industrial Education Division of the State Board of Vocational Education has made available educational consultant services and the use of federal and state funds for instructor salaries.

The Illinois program requires an annual budget of over $13,000. This does not include the salaries of Illinois' two itinerant instructors, who are paid from state vocational funds. Costs in other states vary, but some idea as to overall costs can be gained from Illinois' budget.

Illinois instructors have also been actively involved in programs of hot line maintenance training, the Red Cross training program, special supervisory training programs, membership training demonstrations and the National Job Training Instructors' conferences.

A permanent hot line maintenance training program has been developed in Illinois recently. The facilities for the program are located on the campus of Southern Illinois University in Carbondale. Poles and lines have been erected to duplicate all types of structures used by cooperatives for lines up to 69 kv.

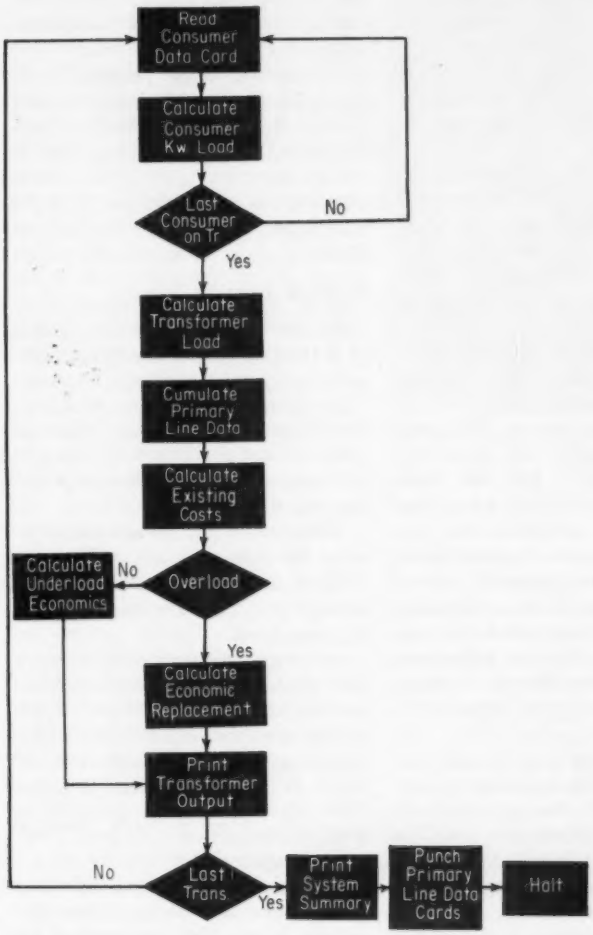
Linemen in training spend one week of each year at the school. The schedule calls for completion of the full course in five years. As a result of the school's operation over the past several years, a number of the larger cooperatives have formed hot line crews composed of three or four trained men who perform all their work on energized lines.

The Red Cross first aid training program is given to all outside and many inside employees. Most of the outside men are also given training in Advanced Red Cross First Aid. Several electric cooperatives qualify their maintenance trucks as "Mobile Red Cross Units," thereby providing a service to their communities by making equipment and men available for any emergency which might arise.

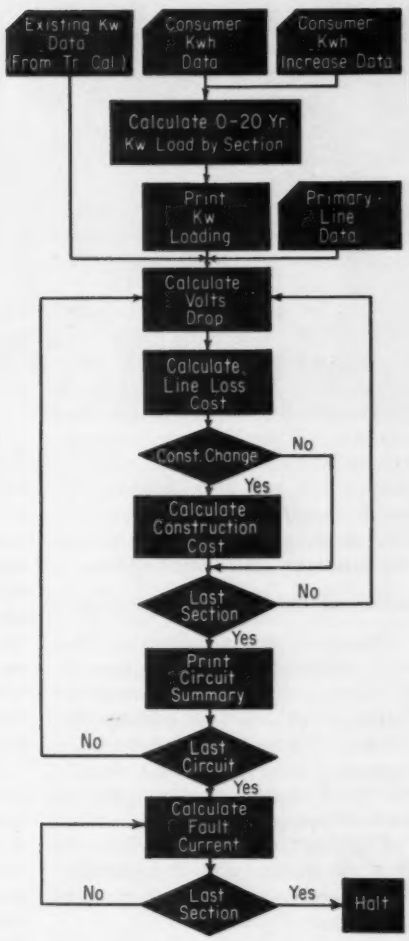
Illinois' two itinerant instructors have worked closely with the Trade and Industrial Education staff personnel for several years to provide supervisory training for both line foremen and supervisory personnel. As needs are recognized, supervisory training programs are offered in job instructor training, job relations training and the techniques of conference leading.

Participation in the National Job Training Instructors' annual conference has been an important help to itinerant instructors. The Illinois Job Training and Safety Committee has provided the funds to send instructors to this conference.

Transformer Loading and Economic Analysis Program



Primary Line Analysis Program



FLOW DIAGRAMS for basic programs provide flexibility. Information developed for the transformer loading and economic analysis program can later be used with little modification in the primary and line analysis program

Computers Help Plan System

EDP equipment can be used advantageously by small systems; two programs provide savings in investment and losses

E. A. STRAUSSER, Patterson & Dewar Engineers, Inc, Decatur, Ga.

● Both long and short-range system planning are ideally suited for computer treatment. Two programs of widespread interest are a transformer loading and economic analysis program and a primary line analysis program.

A large percentage of the investment in any distribution system is in transformers, and transformer energy losses may be as much as 50 to 70% of the distribution losses. Computer calculations can provide economical control over transformer investment and losses.

If transformer load calculations are to be made, transformer records must be cross-referenced with billing records to determine consumption and consumers on each transformer. This must be done unless each transformer is field metered.

The computer program developed requires a data card for each consumer into which is punched a transformer number, size, voltage, consumer kwhr consumption, and a code for the class of each consumer. In addition, the following system data are required: a percent overload and underload limit, initial loading limit, dollar investment per kw demand, percent rate for annual charges, cost of energy, demand cost and retail energy charges. This information is loaded as con-

stant for a given system.

The first calculation is load for individual consumers. The kwhr consumption of each is converted to kw loading, using polynomial equations for various classes of consumers. The kw load of a residential consumer can be calculated using an equation developed specifically for this type of consumer. The program can handle six separate equations for different consumer classifications, all off the same transformer.

As individual loads are calculated, they are cumulated by class until the last consumer load on a given transformer has been determined. The transformer loading is then calculated, taking into account diversity between consumers within a given class and also diversity between various classes of consumers. The diversity can be varied to suit the particular distribution system.

Seasonal Calculations Permitted

The program is written so that both winter and summer loading calculations can be made simultaneously. To calculate the loading conditions from two seasons, the consumer data card must include the peak month consumption for each season.

Consumer data are coded to the primary system, and it is possible to prepare data which can be used in primary system analysis. As a byproduct of the transformer program, cards are punched which give number of consumers, average kwhr consumption per consumer, and kw load based on the transformer calculation for each primary line section on a distribution system.

After calculating transformer loading, the computer makes calculations for the subsequent cost of operating the transformers. The cost calculations include the cost of both core and copper losses, cost of investment and cost due to reduced revenue caused by the regulation.

If the overload limit is exceeded, a replacement transformer size will be calculated and shown in the output. The replacement transformer will be based on economic selection, except that no transformer will be recommended for installation where the proposed loading would exceed predetermined initial loading limits. As an example, if no transformers are to be installed where the loading will be over 100%, the program will recognize this limitation and recommended transformer sizes will conform to this limit regardless of economics.

If the overload limit has not been exceeded, the program will then determine if a replacement can be made which will satisfy the underloading limits. This is done by determining that it would be economical to reduce the size of a given installation if the annual savings realized would exceed a certain limit. Still considering the initial loading limit, a replacement transformer is recommended and shown on the program output if the savings exceed the underload limit.

The program output for each transformer shows the following: transformer number and size; number of consumers served; winter and summer kwhr consumption, kva loading, and percent loading; existing annual costs; proposed annual cost if replacement recommended; recommended transformer size and an overload or underload indication. After the last transformer calculation is made, a system summary is printed.

Of the two types of output, individual transformer loading and economic information is considered as operating information and is used to schedule transformer changeouts. The second type, the system summary, can be considered as a management report and can be used to review transformer installation practices and to determine future policy. After the transformer output is complete, data cards for use with the primary line analysis program are punched.

Savings Pay for Records

Results from this program indicate that the savings realized can pay for the cost of preparing system records and for computer time. In addition to the savings calculated and shown in the system summary output, much greater savings can be made by a tighter system policy and closer supervision of transformer installations. While it is difficult to justify replacement of underloaded transformers, proper initial installation could cut costs.

Computer calculations provide the means for making frequent load calculations for all transformers, thereby providing closer control of the transformer investment. The program also determines the location of overloaded transformers, reducing burnouts and consumer outages.

The analysis of the primary distribution system is in many respects a much more complicated test than that of transformer loading. This is particularly true in long range planning, as many designs must be investigated. Estimating the size of future loads is also involved.

Analyze Existing System

In analyzing the existing system to determine immediate system improvements, the problem is somewhat less complicated. However, determining existing load distribution over the primary system can be an expensive and time-consuming operation.

Additionally, if the system is to serve the existing loads in the most efficient manner, alternate ways of serving present loads may need to be considered.

It is impractical to consider each load in a distribution system when making calculations to determine system conditions. For this reason individual consumer loads are reduced to primary line section loads. When the transformer program is used, this reduction is made as a by-product operation.

In the system analysis all data and calculations are on a per-line-section basis. The kw loading for each primary section is calculated from kwhr and consumer billing data.

If the estimated growth data in the form of percent increases for consumers and kwhr consumption in each section are prepared, a projection of the loading can be calculated for any year.

This method of projecting loads provides flexibility, as each section of line can have a different rate of increase for consumers and kwhr consumption. Although load cannot be projected on the basis of each line section, it is reasonable to assign different rates of increase to various areas of a system. On this basis groups of line sections would be assigned the same rates of increase.

The program can also increase existing system kw loading by a fixed multiple. This is rarely used, because the variable rate of increase

applied to consumption and consumers is more realistic.

To make further calculations for the primary system it is necessary to prepare additional primary line data. This includes miles, construction, voltage and power factor data for each section.

Section sequence data are also required. This is the order in which line sections are to be considered for calculation, beginning at the extremity of a circuit and working toward the substation. By changing this sequence, it is possible to investigate as many design plans as necessary.

If the transformer program has been used to prepare data for the primary analysis program, kw loading for each line section is already calculated and need not be repeated. The program now cumulates kw loading by line section in accordance with section sequence data and then calculates voltage drop and annual cost of line loss in each primary line section. If an investigation of the effect of changing system construction is being considered, the construction cost will also be calculated. This construction cost is not shown for each line section but only as a total for each circuit.

Calculate Fault Currents

After voltage drop and loss have been calculated, fault currents for each line section are calculated. This is optional, because in many cases fault current calculations may not be required, particularly if the analysis is for a future design plan. The fault current calculation output shows the line section number, along with the calculated 3-phase and single-phase faults at the end of each section.

Initial computer calculations for a distribution system require additional time for preparation of basic data. Even considering data preparation time, computer calculations cannot be duplicated manually at a comparable cost. In addition, the computer will provide answers at a considerable savings in time, with better accuracy, and in a printed and legible form to be used by the engineer in determining system improvement recommendations.

The greatest benefits are derived where procedures and systems are developed which permit continued computer use. If consumer billing procedure is coordinated with engineering calculations and basic system data is maintained, complete system calculations can be made periodically. These calculations can be made economically and quickly, permitting the engineer to make system improvements in line with actual load conditions.

The consumer and consumption data are excellent for determining load projection. As these data are collected, additional programs determine the rates of increase for each line section. Information of this type can rarely be developed where only manual methods are used.

The transformer program previously described can be expanded to include consideration of voltage drop and secondary system losses. The transformer and the primary analysis can be tied together so primary system conditions can be considered in transformer replacement analysis. This permits the program to consider heavier loading of distribution transformers located near a substation as compared to those near the end of a circuit.

A more sophisticated program can be formed for the primary system where the computer will do more analysis and design, rather than merely making calculations for engineering analysis. The program can decide what system improvements will give the most economical design for a given set of load conditions. To obtain maximum benefit, the program should evaluate the rate of load growth for each part of the system and consider this factor in determining improvements. It should also be possible to develop a program which can determine the service area for each circuit.

Programs can analyze system outage and equipment failure records to aid in determining service reliability. This can be included as data to the primary analysis program, and the output will include an evaluation of service reliability of a line as well as its economics.

DIGITAL COMPUTERS of various types may be used. Small systems can make use of limited memory calculators, but larger computers offer greatest promise

Better Records Required

Applying computers for distribution system analysis requires better records than have normally been required. Experience to date indicates that a computer is both practical and economical, even considering the additional record keeping. The time required for a system analysis is reduced and the quality of engineering is improved, because more time can be devoted to engineering and less to calculation of details. Factual information per unit cost presented as a basis for decision is increased.

It is possible to make useful calculations using some of the limited memory calculators now available. However, larger computers offer the greatest promise for distribution engineering. A stored program computer with a large memory, particularly magnetic tape memory devices, can use programs that will consider nearly all variables influencing a system.

Use Long-Range Plan to Improve

Determine a flexible plan subject to periodic review, which may be revised or expanded as conditions change

E. H. BRECKENFELDER, Stanley Engineering Co, Consulting Engineers, Muscatine, Iowa.

● The increasing complexity of rural distribution systems requires a corresponding increase in long-range planning. Today's long-range plan provides a guide for adding system improvements to maximize line construction that will fit into a future system.

The plan is flexible and is subject to a periodic review, and it may be revised or expanded as system conditions warrant. It is designed to provide adequate service to all consumers at minimum cost with a maximum of reliability.

System improvements are not scheduled by a definite time period, but rather are keyed to actual system needs and will not be added until the need for them has been established through actual field measurements on the system.

Rural distribution system long-range plans have shown trends which occur to varying degrees on each system. An average of statistical data gathered from several of these plans is presented in the table. From the table, it is seen that the average design load for a long-range plan is from four to five times the present load.

In order to properly serve this load, the number of substations will increase about 2½ times, with average substations size increasing about 75%. There will be less than a 10% increase in the miles of distribution line on the system, although the miles of 3-phase feeder line will more than double, not including the added lines required to serve loads needing 3-phase service.

In addition to this data, there are also trends evident in the added investment in distribution plant which will be required. On the average system, the added investment to serve four to five times the present load will be slightly less than the existing investment, based on current cost estimates.

Of this added investment, over 45% will be required for increasing the distribution transformer capacity. Another 25% will be required for services, including meters and secondaries. The remainder will provide new line, line conversion, voltage regulators and sectionalizing equipment.

Maximum practical use will be made of existing facilities, and very few substations will be abandoned or relocated. Existing feeders will be used wherever possible.

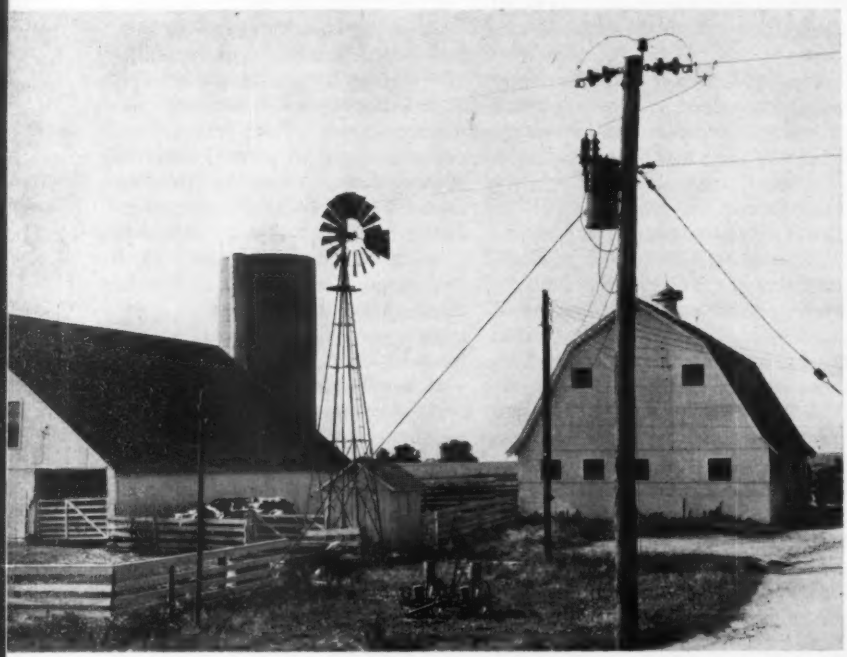
Higher Voltages Considered

The question of conversion of the present 7.2/12.5-kv systems to a higher distribution voltage should be considered in the plan. It is hazardous to generalize on this point. However, few cases in the Midwest have been found where such a conversion is economically feasible. A principal exception has been found on long lines serving few customers.

In addition to the economic disadvantage of conversion to a higher voltage, there are operating problems encountered in maintaining reliable service during the conversion period. It seems likely, therefore, that the average distribution system will retain its present distribution voltage level for many years. Continuing study is given this point as changes occur in such factors as code clearances and cost of dual-voltage distribution transformers.

Consideration must also be given to the power supply. In some cases a compromise on substation location is necessary. However, a sound long-range plan can be modified at the time construction is necessary to best fit new conditions as they arise. The plan should not be restricted by initial conditions, as these may change from year to year. Improvements which appear impractical or impossible to build today may be quite simple by the time they are needed.

In addition to the long-range plan, annual work plans must be prepared. While the long-range plan is based on future loads, the annual work plan is based on present system conditions and presents in detail system improvements which are



System

necessary for the immediate future. These improvements are added to fit into the long-range system. Prior to the time the annual work plan is prepared, the long-range plan is reviewed in the light of up-to-date system conditions. If necessary, the long-range plan is revised or supplemented to adjust for conditions.

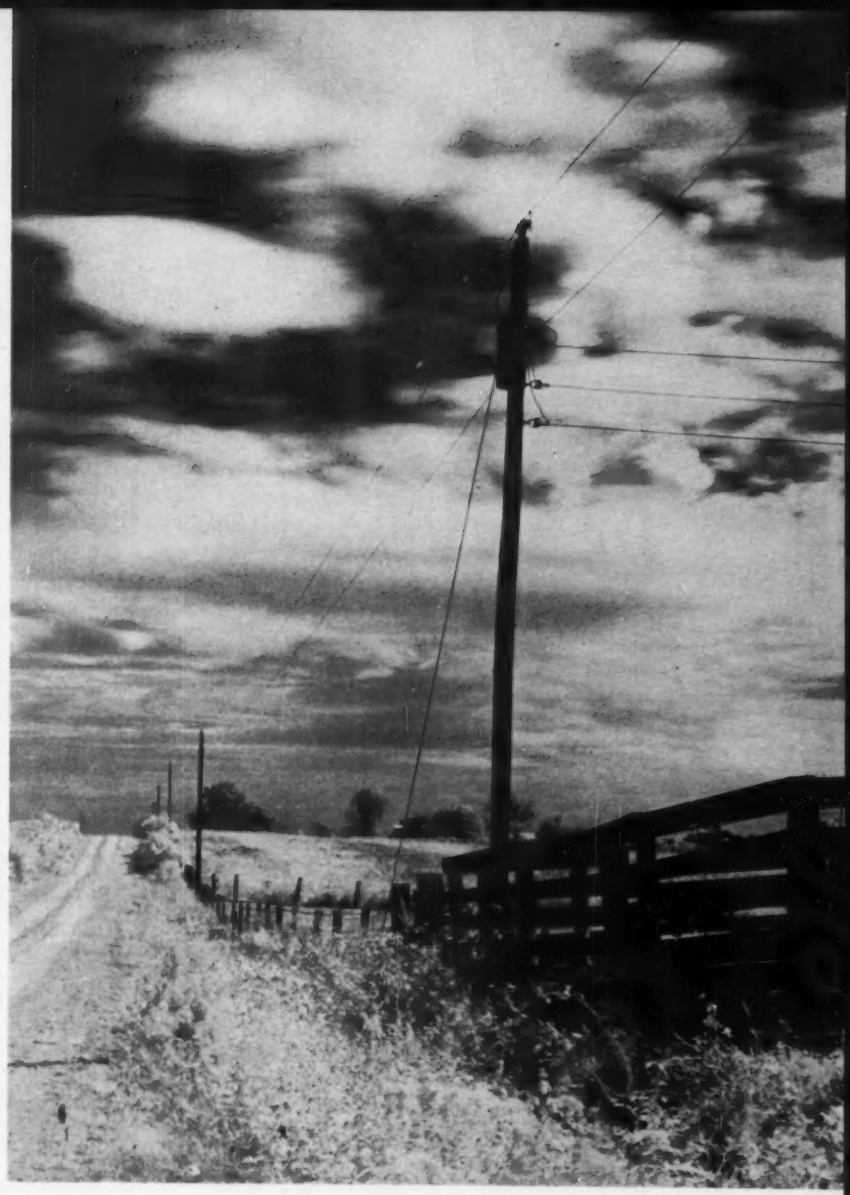
The annual work plan provides an opportunity to develop necessary line improvements and to review items of operating interest. The system sectionalizing is examined carefully, taking into account changes in power source and step-down substation capacity which will occur in the near future. Outage reports and recloser operations are studied to determine ways of improving system reliability.

While the word annual is used here, the annual work plan must also anticipate the need for system improvements which require more than a year for development. These considerations are primarily new substations and power supply.

Today the actual usage on the rural systems in the Midwest is in the range of 500 kwhr/month/farm consumer, and the trend indicates a doubling of load every seven to ten years. Some systems have been observing a decrease in the total number of farms served. This decrease, however, is offset by increased usage on the farms remaining. With fewer farms and less available labor, farmers are turning more and more to electricity to lighten the work load. There is, in general, an increase in non-farm residential and industrial loads in rural areas.

There have been great strides in rural distribution planning during the past 20 years. Initially, the primary objective of these systems was to provide area coverage, with relatively little thought given to planning for future increases, because few could foresee the tremendous growth to follow.

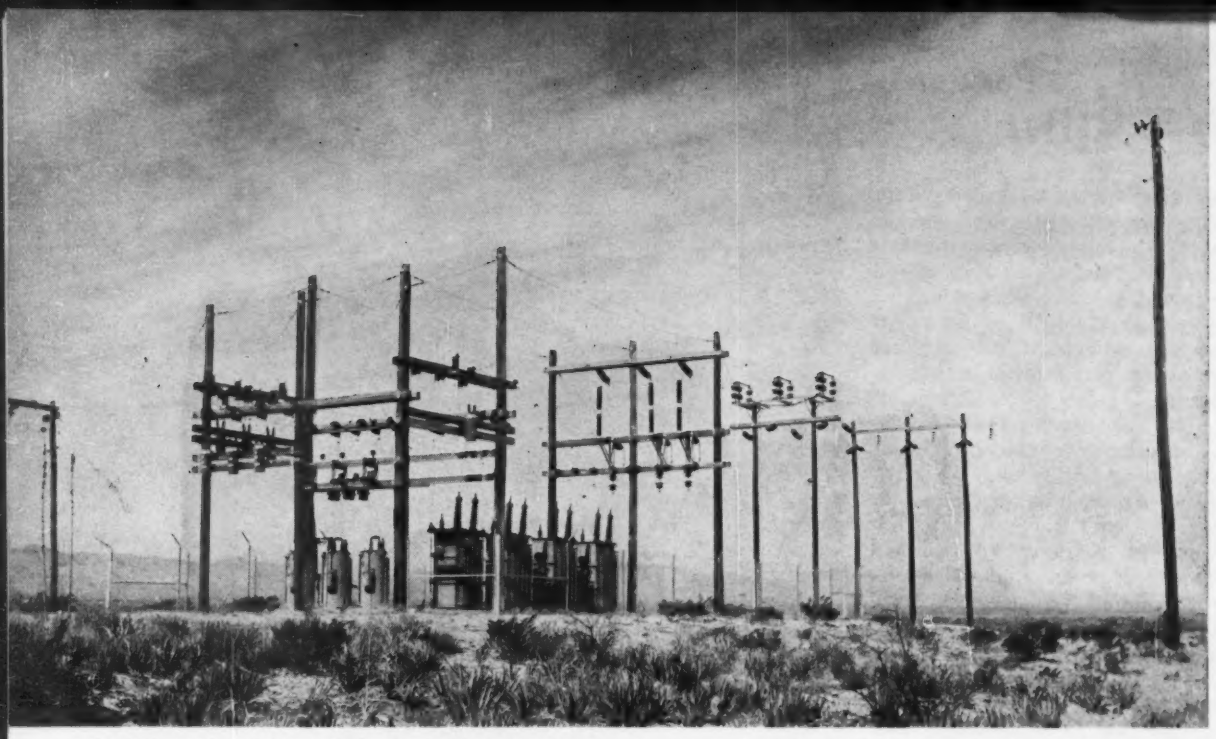
The long-range plan of today is not a fixed answer for the rural system. As loads grow, the planning must grow and become more sophisticated. The planning must attempt to use the most modern methods available in order to provide adequate, dependable, low-cost service.



Average Rural Midwest System Faces Rapid Growth

	Present	Future*
Consumers	3,130	3,450
Kwhr per Consumer (peak demand month)	485	2,200
System Peak Demand, kw	4,100	19,500
Substations:		
Number	4	9.5
Average Size, kva	1,300	2,050
Miles of Line: Total	1,193	1,287
Single-phase	1,020	922
V-phase	42	73
3-phase	131	292

* No date is set for attainment of future conditions.



WOOD POLE SUBSTATION STRUCTURES have been found adaptable in the Rio Grande Co-op's area west of the Pecos River, where humidity is extremely low. Drying out and shrinking requires maintenance to keep hardware tight

small systems engineering

Conversion to 14.4/24.9-Kv Proves

Rio Grande Electric Co-op finds that overall costs are lower after ten years' experience with higher voltage

OLAF T. LODAL, Partner, Gullatt, Lodal and Sueltenfuss, Inc, Consulting Engineers, San Antonio, Tex.
THOMAS J. HURD, General Manager, Rio Grande Electric Cooperative, Inc, Brackettville, Tex.

● The Rio Grande Electric Cooperative, the country's largest in terms of area served, has found that 14.4/24.9-kv primary circuits cut costs in serving a system that averages 1.44 miles between consumers. The conversion was made from 7.2/12.5-kv.

When the Rio Grande took on a large addition to its service area in 1951, the economics of serving widely-scattered loads became more critical. There was a possible pumping load of 15,000 to 18,000 hp available, and pump loads of up to 300 hp per pump could be served economically at 14.4/24.9-kv by using much smaller conductors than would be required if the system was designed for 7.2/12.5-kv.

Studies revealed that the cost per mile of line for the higher voltage would be about 20% greater than the cost of the lower voltage line built for the same density and conductivity. However, the greater carrying capacity of 14.4-kv, permitting single-phase lines to extend more than 100 miles from the source of power, presented possibilities for more economical service.

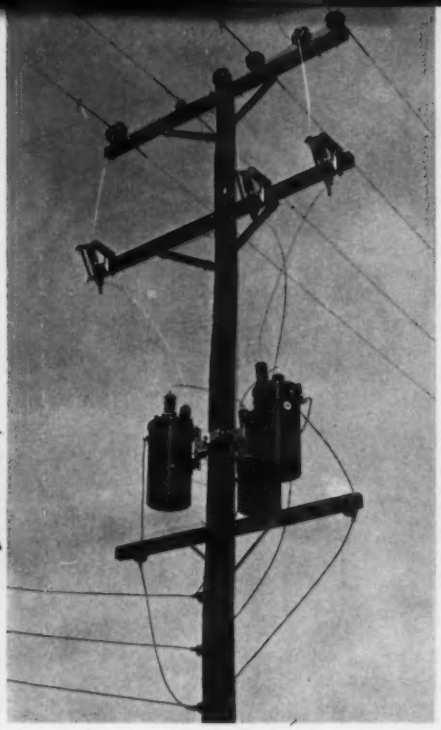
Power sources in the area were scarce, and further studies showed that overall costs per consumer served from fewer substations over longer lines at the higher voltage were considerably less than the costs of additional power sources and shorter lines using the lower voltage. Not only would the 14.4/24.9-kv lines result in more economical and properly regulated lines, but they would also solve the problem of scarce power sources.

Essentially the same configuration and separation between conductors is being used on 14.4/24.9-kv construction as was used on 7.2/12.5-kv construction. Two feet of additional ground clearance, available from existing construction, was provided.

However, this did not increase the number of poles per mile, because the same span length was used for both voltages. Although, theoretically, a longer span can be used on the 7.2/12.5-kv construction, this had not been done because of the desire for better service and reduced maintenance costs.

It was necessary to design substations to handle much greater charging currents than had been experienced on the 7.2/12.5-kv systems. For instance, a 500-mile system of mostly single-phase 14.4-kv lines will produce charging current at the substation of approximately 500 kva, which in some cases may be greater than the demand. This problem was solved by providing ample substation capacity for both the kw and kvar demand.

The only objectionable feature encountered in the use of 14.4/24.9-kv instead of 7.2/12.5-kv was radio and television interference. One



CLUSTER-MOUNTED transformer units are used to serve irrigation pumps

NO ADDITIONAL HAND TOOLS are needed to frame poles for 14.4/24.9-kv lines. Wooden crossarm braces help to minimize radio and TV interference

Economical in Low-Density Area

source of radio interference was eliminated by designing the structure so that no grounded part was nearer than 15 in. to any hardware that supported the phase conductor. An arcing horn constructed of No. 4 HD copper was installed to protect the pole top between the arcing horn and the ridge pin at the top and the neutral conductor at the bottom.

The primary lead in the distribution transformer bushing was another source of radio and television noise. This has been corrected by the transformer manufacturer. Keeping hardware tight by using good maintenance procedures has eliminated radio noise as a problem.

Generally, every effort had been made to construct distribution lines along, or as near as possible to, some type of road. This results in better service and more economical operation and maintenance of lines.

As Rio Grande's operating territory was expanded, roads of all types became extremely scarce. The practice of following roads was therefore abandoned, and the new line location policy became "a straight line is the shortest distance between two points." This helped keep line lengths and costs to a minimum.

Conversion of existing 7.2-kv lines to 14.4-kv is a rather simple matter. The principal change is in the increased insulation requirements of the higher voltage. The outstanding example of this is in single-phase construction. The 7.2-kv pole top pin and insulator has a combined weight of 4 lb 4 oz, versus 11 lb 12 oz for 14.4-kv circuits. Distribution transformers are slightly more expensive for the higher voltage but differ little in size and weight from 7.2-kv models.

Generally, existing 7.2-kv pole lines are readily adaptable for use in systems converted to 14.4-kv. Pole specifications, as a rule, are the same, with only a few exceptions. Pole changeouts for increased clearance or strength are required only occasionally. Oil circuit reclosers of the distribution line type are available for 14.4/24.9-kv systems at a slightly higher price.

After ten years of effort and six years of construction activity, 2,500 miles of 14.4/24.9-kv lines are in operation and about 1,000 more miles are under construction. These 3,500 miles of line, covering approximately 36,000 square miles of West Texas and 4,000 square miles of New Mexico, are being served by six substations, compared to the seven substations required to serve the 10,000 square miles which comprised the original service area.

POLE TOP PIN and insulator of 7.2-kv weighs only one-third of 14.4/24.9-kv

Cyclic Generation Cuts Fuel Costs

Plants shutting down unneeded units during light load periods find economies over operation at minimum load

W. E. RUSHLOW, Systems Operations Engineer, Rural Electrification Administration, Washington, D. C.

● Fuel costs may be cut sharply by close examination of the relative economy of shutting down steam plant units not required for load-carrying purposes versus running units at light loads. From information gleaned from monthly operating reports of REA-financed cooperatives, the overall costs are reduced considerably for those plants which change to shutting down boilers and turbines which are not needed for load-carrying purposes.

Fig 1 illustrates the experience of one system which has changed from continuous operation to daily shut-down and start-up. Over the period during which start-ups approximated one per day (shut-down during the night low-load hours), the average net heat rate fell from 16,300 Btu per net kwhr to 15,170 Btu per net kwhr, or 1,130 Btu per net kwhr. This is a 7% saving in the total annual fuel costs. Over the period considered, the plant factor was substantially constant, and no increase could be detected in maintenance costs.

Of vital interest in determining the relative economics of daily shut-down versus continuous operation are the plant start-up fuel requirements.

A recent REA sample survey shows wide variations. It is recognized that fuel requirements will vary, depending on equipment and start-up procedures employed. However, it is believed that in many cases more economical procedures could be employed without additional risk to plant personnel or apparatus.

Fig 2 illustrates the energy required to start up a boiler, turbine and combination for various hours of down time. Although the curve is for an 11,500-kw unit, it is typical for the data received for 7,500 to 15,000-kw units. Insufficient data have been received to plot corresponding graphs for larger size units.

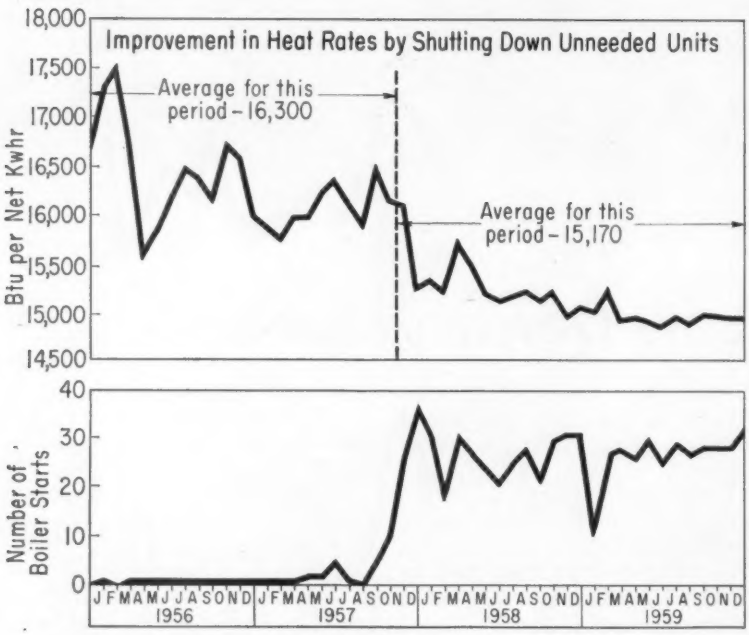

Improvement in Heat Rates by Shutting Down Unneeded Units
Average for this period – 16,300
Average for this period – 15,170
Btu per Net Kwhr
18,000
17,500
17,000
16,500
16,000
15,500
15,000
14,500
Number of Boiler Starts
40
30
20
10
0
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1956
1957
1958
1959

FIG 1. CHANGING FROM CONTINUOUS OPERATION to daily shut-down and start-up produced a reduction in heat rate of 1,130 Btu per net kwhr, or 7%

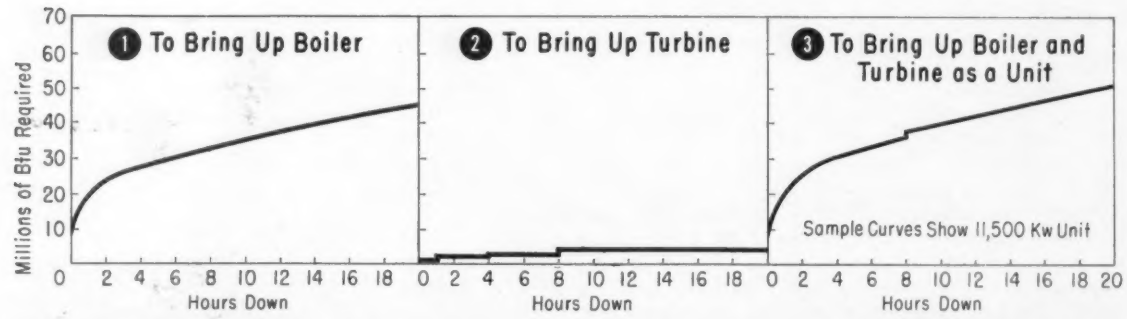
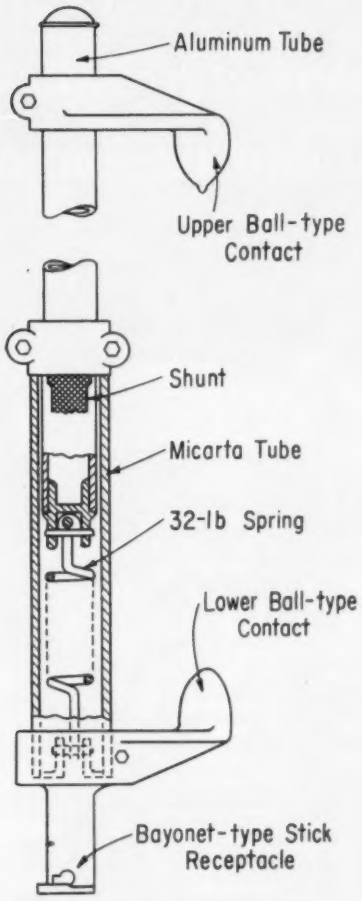


FIG 2. START-UP REQUIREMENTS in Btu for boiler, turbine and combination for various hours of down time were derived from an 11,500-kw unit. It is typical of the data obtained from most units in the 7,500 to 15,000-kw range

Simplify Grounding of OCB's

JOHN E. COLES, Electrical Engineer,
New Orleans Public Service, Inc,
New Orleans, La.



New Orleans Public Service has greatly simplified the usual method of grounding 115-kv and 13.8-kv substation equipment. NOPSI engineers, in conjunction with a manufacturer, have designed and built a device which is used in place of ground leads with hot-line clamps.

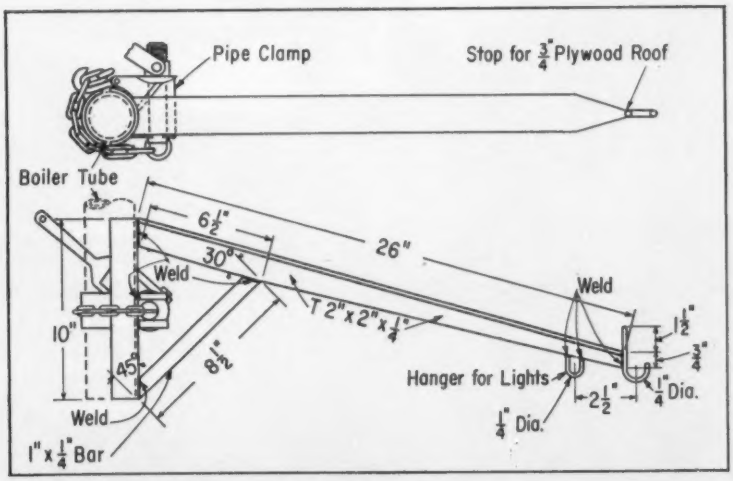
The new grounding equipment consists of ball connectors at the upper and lower ends of an aluminum tube. The lower end of the device houses a spring. Socket connectors are permanently mounted on the upper and lower ends of each oil circuit breaker bushing, from which point most substation equipment can be grounded.

The lower end of the grounding device has a receptacle for a bayonet-type switch stick. The bayonet stick is used to raise the grounding device, which weighs less than 13 lb, into place. The upper ball and socket connectors

are connected first. Then, by pulling downward against the spring, the lower ball and socket connectors are brought into place. The spring assures that a tight connection is made.

All NOPSI 115-kv and 13.8-kv substations are being equipped to use this grounding device, which the manufacturer rates at 40,000 amp for 15 cycles. Experience has been satisfactory.

Bracket Holds Protective Plywood 'Roof' in Boiler



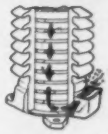
A clamp and bracket that can be installed without the use of tools were developed at the Shawnee Plant of Tennessee Valley Authority to hold a "roof" over men working in the boilers. The bracket supports a roof of 8x2-ft plywood.

Formerly, the plywood roof was attached to wall tubes with U-bolts, which required the use of wrenches and nuts. The bracket now is held with a chain and turnpull pipe clamp. Use of the bracket has resulted in a substantial saving in man-hours that easily offsets the initial cost of the clamp.

WHEN SUSTAINED POWER OVERVOLTAGES OCCUR, HERE'S

How General Electric arresters relieve internal pressure, protect equipment and personnel

Obtain system-wide protection with General Electric Magne-valve arresters

Power overvoltages severe enough to cause arrester failure rarely occur on modern systems. When they do, General Electric Magne-valve* arresters have a built-in device, designed to prevent damage to nearby apparatus. Internal pressures are relieved when metal diaphragms are burned-through by the same short-circuit arc that starts to build up pressure. In high-voltage form 3K, station-class units, internal pressure is further relieved by rapid transfer of the short-circuit arc to the outside of the arrester. 

In addition to burn-through diaphragms, Magne-valve distribution arresters for direct-line connection have ground-lead disconnectors to prevent line lockout in the event of arrester damage. These relief devices mean extra safety with General Electric Magne-valve lightning arresters—the most dependable all-round protection you can obtain.

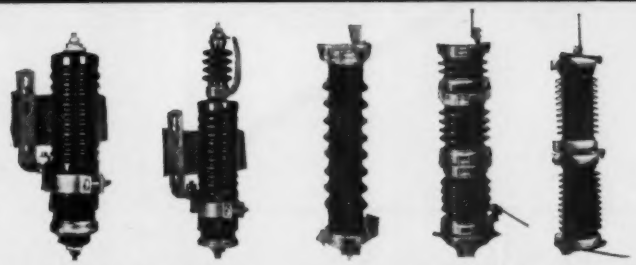
For complete details about pressure relief and many other exclusive lightning arrester features, see your General Electric Sales Engineer. Fill in the coupon below for free booklets of industry standard certified-test-data on General Electric Magne-valve lightning arresters.

* Combines magnetic gap action with Thyrite® valve action.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Don Herbert explains the self-protection features of General Electric lightning arresters.



Distribution, direct-connected and externally gapped 3-20 KV

Intermediate 3-121 KV

Station-class Form 3K 60-276 KV, Form 1H 3-121 KV

Section A488-03, General Electric Company
Schenectady, New York

Please send me a copy of certified design test data for the following General Electric lightning arresters.

- ☐ Distribution (GET-3035)
- ☐ Intermediate Form 2H, (GET-3036)
- ☐ Station class, Form 1H (GET-3037)
- ☐ Station class, Form 3K (GET-3033)

NAME _____

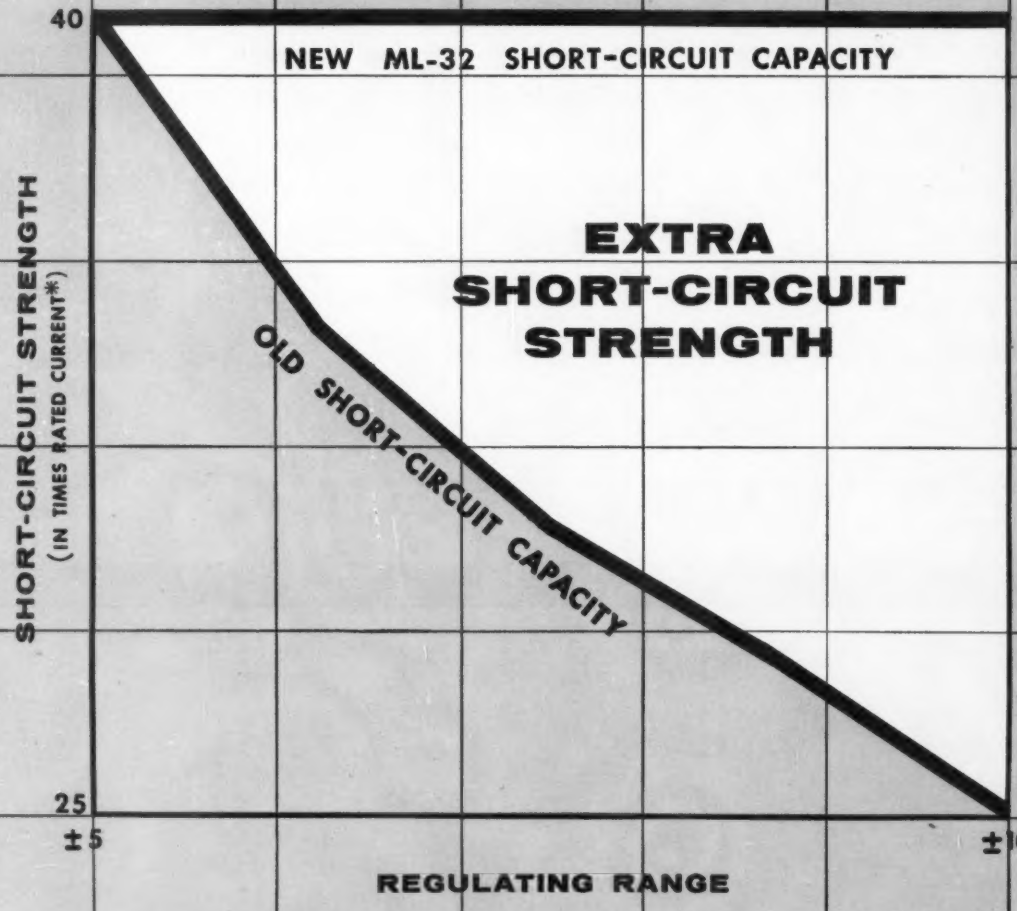
TITLE _____

COMPANY _____

ADDRESS _____

NOW STANDARD ON ALL GENERAL ELECTRIC

40 times rated current* short-



* *Rated current is the nameplate current at ±10% regulation.*

SINGLE-PHASE STEP VOLTAGE REGULATORS

circuit strength

New, stronger coil windings of General Electric single-phase ML-32 step voltage regulators will now withstand short-circuit currents of 40-times basic nameplate rating (the basic current rating at ±10% regulation) at all Load Bonus positions.

This increased short-circuit capacity is available for a duration of 0.8 seconds (48 cycles). With modern breakers, this time period gives ample leeway to detect a fault and de-energize the circuit.

Additional strength to resist high-current forces means increased protection against service outage under all current loads, plus even longer dependable life for already superior General Electric voltage regulators. Both of these important benefits are now available in G-E regulators at no increase in price.

These service extras are now possible because of the following G-E design improvements:

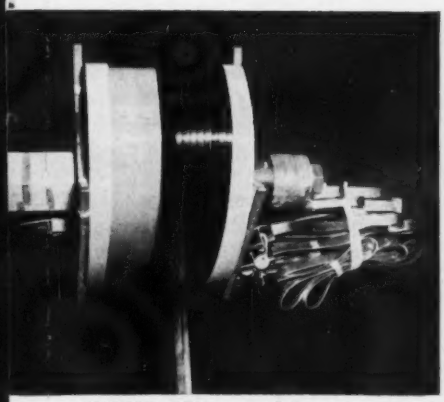
- **TIGHTER WINDINGS**—new coil winding process provides tighter, even coils; inherently stronger, better able to resist coil movement caused by short-circuit stresses.
- **SPECIAL INSULATION**—specially treated layer insulation forms a stronger winding-to-winding bond for finished coil. Additional protection added at points of most-severe stress to further resist coil shifting.
- **CONTROLLED DUCT SPACING**—cooling duct spacers are accurately positioned to hold windings firmly in place against radial forces during short circuits.
- **BALANCED WINDINGS**—coils are precisely aligned to resist destructive forces caused by short circuits.

This new high standard for voltage regulators is another dividend you receive from G-E research.

To learn more about all the reasons why G-E Voltage Regulators Cost Less on the Line, contact your nearby General Electric Apparatus Sales Office or Agent. Or write for Bulletin GED-3905, General Electric Company, Section 423-41, Schenectady 5, N. Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC



RUGGED COIL wound by new process provides stronger resistance to forces caused by high short-circuit current.

SPECIAL INSULATION strengthens coil by stronger winding-to-winding bond, resists movement caused by short-circuit currents.

EXTRA REGULATOR STRENGTH

(for a typical ML-32 100-ampere unit)

Regulating Range	Current Range	Former Short-circuit Capacity	NEW Short-circuit Capacity
±10%	100 amp (normal)	2500 amp	4000 amp
±8¾%	110 amp (load bonus)	2750 amp	4000 amp
±7½%	120 amp (load bonus)	3000 amp	4000 amp
±6¼%	135 amp (load bonus)	3375 amp	4000 amp
±5%	160 amp (load bonus)	4000 amp	4000 amp

Three-Phase Distribution

L. H. SCOTT, Distribution System Engineer, Florida Power Corp, St. Petersburg, Fla.

To provide a standard practice for selecting transformer bank sizes, a set of charts can be prepared to expedite the determination of proper combinations by field engineers.

Of course, a simple chart is not the answer to every problem, but it can be used for most cases.

Only wye primaries were considered since Florida Power Corp's standard primary voltage is 12.47 kv wye. Wye-delta banks are connected with the wye mid-point floating. The "preferred" chart considers only the use of standard transformer sizes, which are 5, 15, 25, and 100 kva.

Selection of 3-phase transformer banks should be made on the basis of a combination of economics and electrical characteristics. Open-wye/open-delta banks are the most economical generally, but are limited in size by neutral current and load voltage unbalance. This bank is used when load is 25 hp or less.

Open-wye banks introduce a considerable current in the neutral (approximately the same current as if

Three-Phase Transformer Selection Chart No. 1

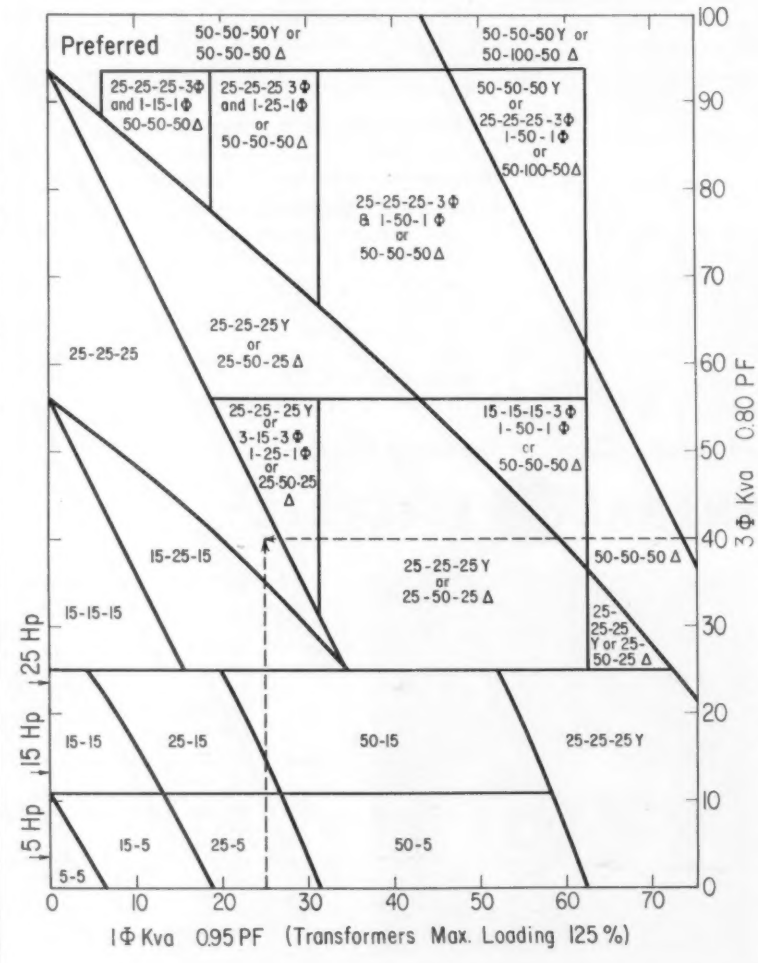


Chart No. 1 expedites determination of the preferred transformer combination to use under various combinations of 3-phase and single-phase loads. The limitation on use of the open-wye/open-delta bank is based primarily on neutral current flow. It may be used for 3-phase loads above 25 hp satisfactorily provided there are similar open banks nearby to balance load and provided no single motor has a locked-rotor current exceeding that of a 25-hp type "G" motor.

All charts are based on a maximum transformer loading of 125%. When more than one combination of transformers is given, the top combination shown is most economical.

In some load combination areas it is more economical to use a separate 3-phase bank for the 3-phase load and a single-phase transformer for the single-phase load. This would, of course, not be practical unless one customer required only 3-phase.

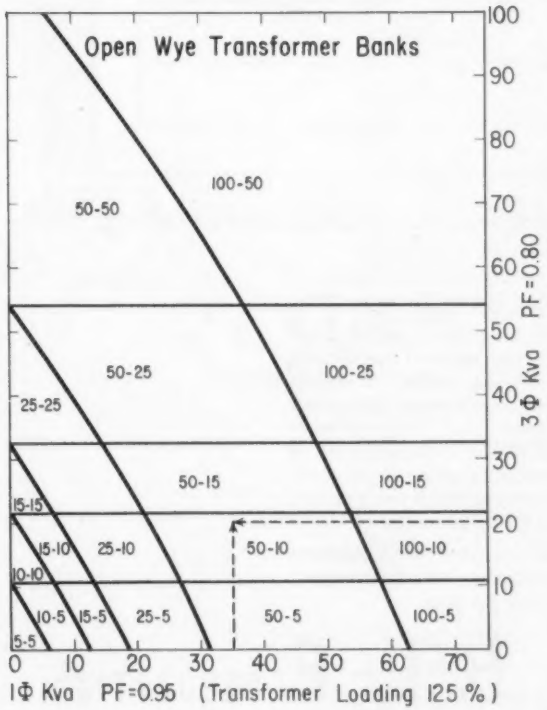
Transformer Bank Selection

the total load were single phase) as well as unbalanced primary phase currents. This neutral current and attendant unbalanced phase currents cannot be balanced out properly by single-phase transformer loads, but only by other similar banks rotated on the phases. This is because of the phase angle shift in the open bank and, therefore, open banks should be rotated on the three phases and not only connected to "A" and "C" phases as is sometimes the case.

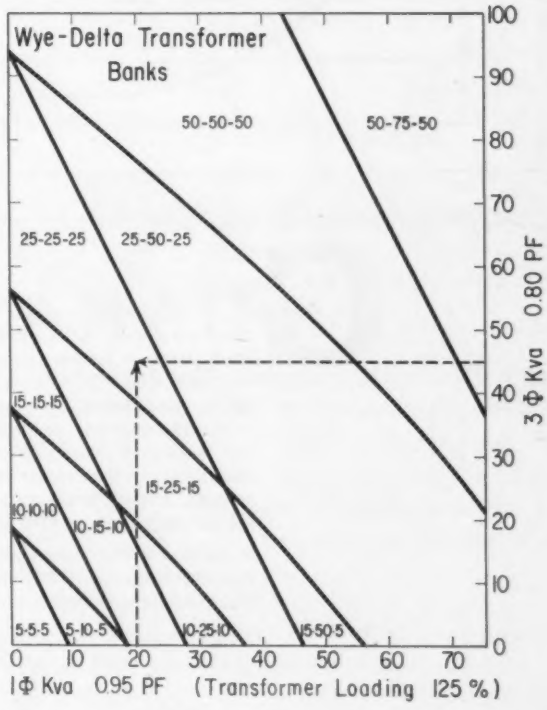
Secondary voltage unbalance is determined primarily by the amount of single-phase load on the bank. Voltage balance will generally be as good with an open bank as a closed one except where the single-phase load is small. When the single-phase load is greater than 25 kva, secondary voltage unbalance may be appreciable on either open or closed-delta secondaries. A wye-connected secondary will produce balanced voltages under balanced loading.

"CSP" transformers may be used in open-wye/open-delta transformer banks. Conventional transformers will be used in three-transformer banks.

Three-Phase Transformer Selection Chart No. 2



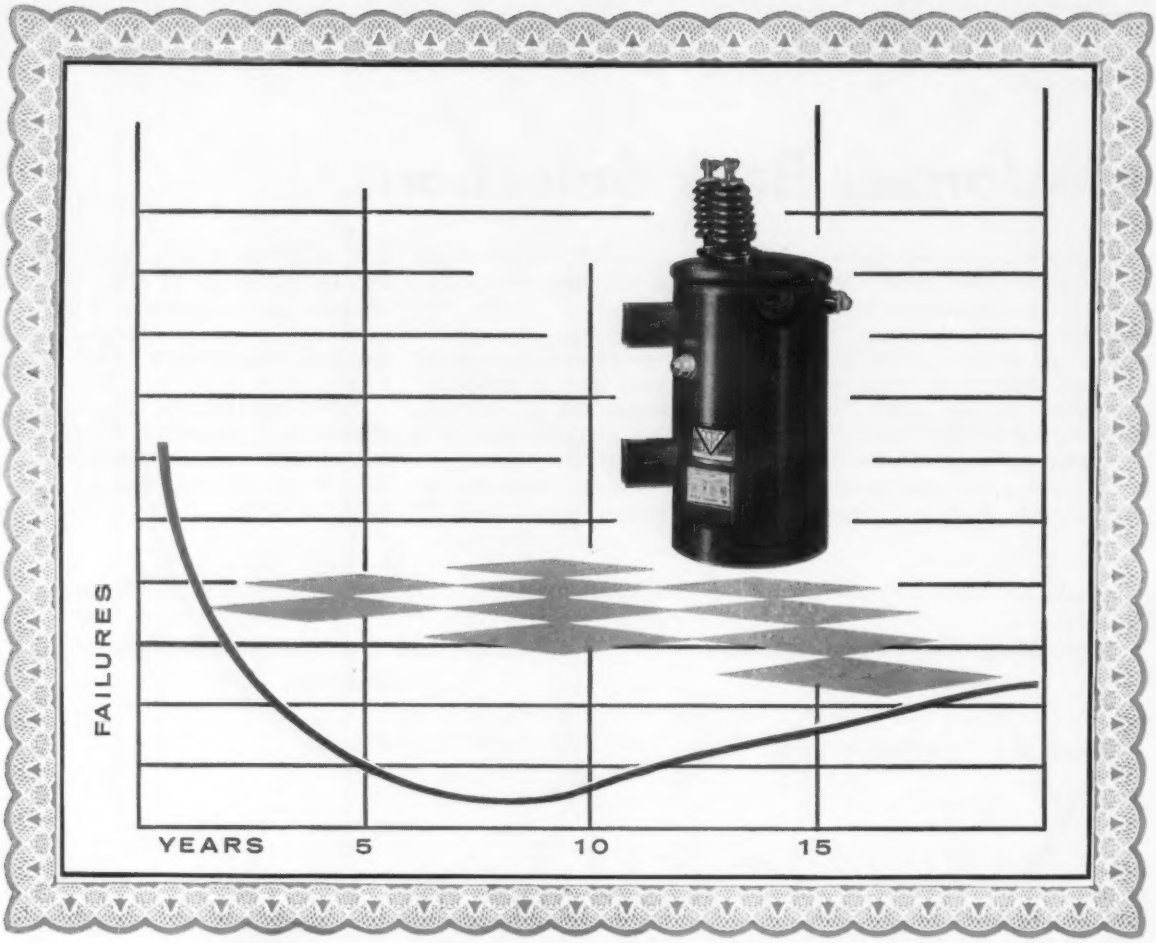
Three-Phase Transformer Selection Chart No. 3



Charts No. 2 & 3 facilitate determination of the proper transformer combination when a combination other than the "preferred" is necessary. 10-kva transformers were also included in these charts since they are sometimes available, even though this is not a company standard size.

Chart No. 2 shows the correct transformer combination to use under any loading combination if an open-wye bank of single-phase transformers is to be used.

Chart No. 3 shows the correct transformer combination to use under any loading combination if a closed wye-delta bank is used.



GUARANTEED

for 5 years — further proof of the exceptional quality built into every RT&E Transformer to save you money. The wisdom of this guarantee is borne out by the graph above. This typical mortality curve was developed from actual failure rates of one leading utility and covers all makes of transformers. It shows clearly that most transformer failures due to workmanship and materials occur during the first 5 years of use, the critical period covered by the RT&E guarantee.

In addition to this 5 year guarantee against defective materials and workmanship, RT&E also guarantees all fully protected transformers unconditionally for one full year.

RT&E CORPORATION

WAUKESHA, WISCONSIN
PORTLAND, OREGON

EE

SALESMEN ▶ **A purchasing executive had a chance to beard manufacturers** in their own lair a few weeks ago. In this particular case it was H. L. Consley, director of purchases, York Div of Borg-Warner Corp, speaking before the Copper and Brass Research Assn, but his views would carry for a lot of utility PA's too. Here are some of the tips he gave to his suppliers:

" . . . We would like to keep the (salesman) that we have now . . . We have money and time invested in his 'on-our-job-training.' "

"One of (your salesman's) biggest responsibilities is to keep so well informed on our requirements and problems that he can guide your mills, laboratories, and research organization into a position from which they can help us most . . . "

"The greatest fault of you and your salesman is to make a sale and fail to follow-up . . . If you are going to get order number two, you should start selling it immediately after you have order number one in your hands. . . ."

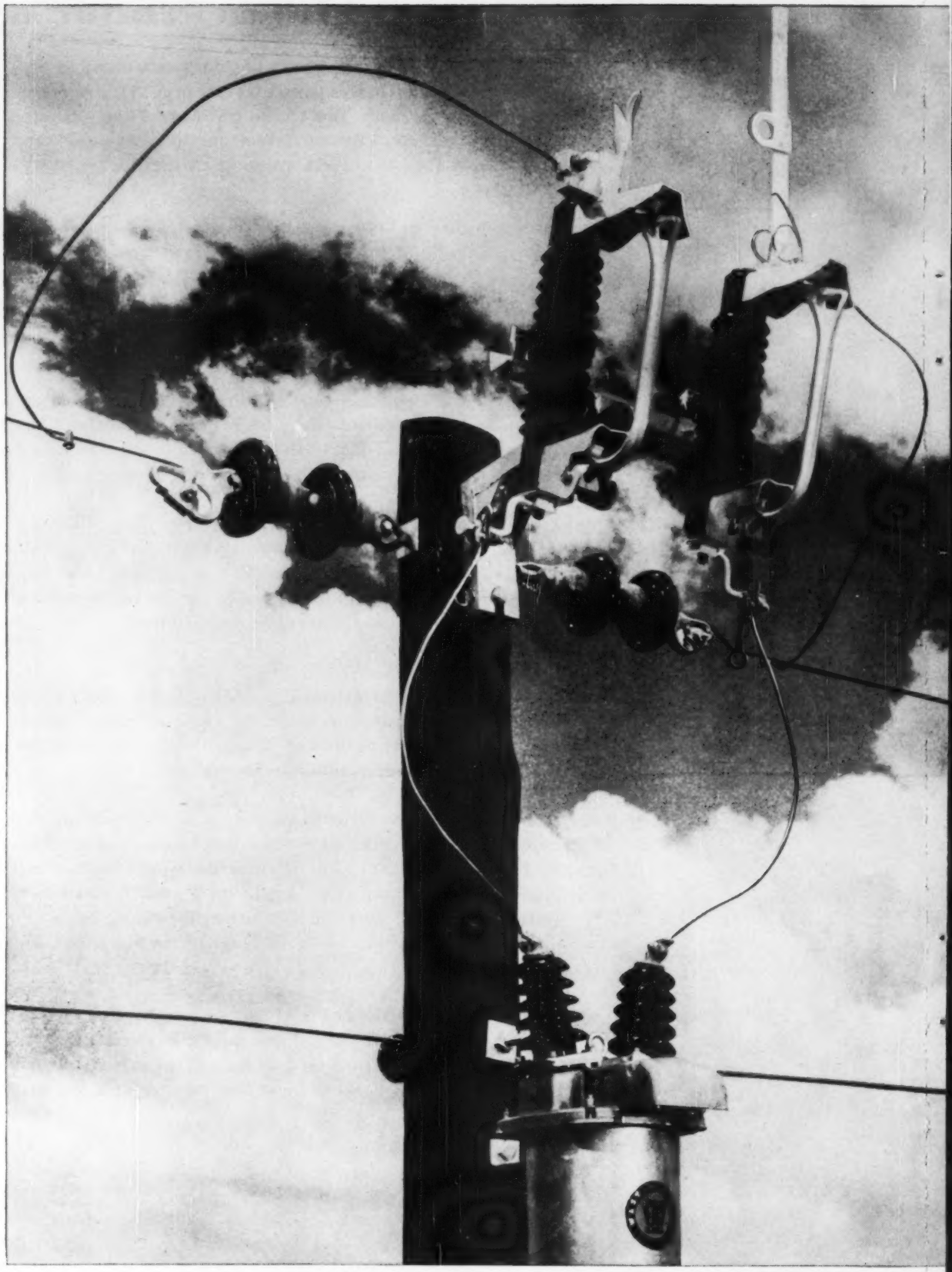
COPPER ▶ **Copper to average 31¢ a lb. this year?** That's the price still being forecast by Engineering and Mining Journal despite the fact that the red metal has clung at 33¢ a lb. since early in the year. Electrical equipment manufacturers and utilities are by far the largest users of copper. It is estimated that the two use approximately 37% of all copper consumed domestically.

EQUIPMENT ▶ **Current transformer line is extended** by Allis-Chalmers Mfg Co to include a 900-kv BIL unit, said to be the highest voltage current transformer of its type ever built. Complete with oil, it is comparable in weight to a 250-kva distribution transformer.

LABOR ▶ **No settlement was in sight** between Westinghouse Electric Corp and the union representing workers at the company's steam turbine plant. Both management and labor indicated that the work stoppage may last a long time. At issue are some 51 grievances made by the union, and the recent firing of three union men. Westinghouse would make no statement as to how the work stoppage would affect shipments of turbines to utilities.

FREIGHT ▶ **Eastern railroads reported some increase in freight revenues** for 1959 compared with 1958, but noted that the 1959 revenues from all sources still figured to a return on average net investment of only 2.27% for the year. Passenger revenues for the year were less than in 1958.

News of Manufacturers . . . . . page 57
New Equipment . . . . . page 64
Readers Service . . . . . page 68



New from Westinghouse...

ECONOMICAL DISTRIBUTION BY-PASS SWITCH TAKES THE HAZARD OUT OF RECLOSER & REGULATOR MAINTENANCE

The RBS Distribution By-Pass Switch reduces the possibility of injury to linemen when by-passing reclosers and regulators for periodic maintenance. Westinghouse has designed the RBS switch to eliminate dangerous jumpers and other temporary expedients.

The key is simplicity of design. Two standard Westinghouse open-type cutouts are mounted on a common bracket with a by-pass blade mounted across the upper cutout terminals. The removal of the recloser or regulator is a simple, three-step operation: one, the by-pass blade is closed; two, the recloser is opened; three, the two disconnect switches are opened.

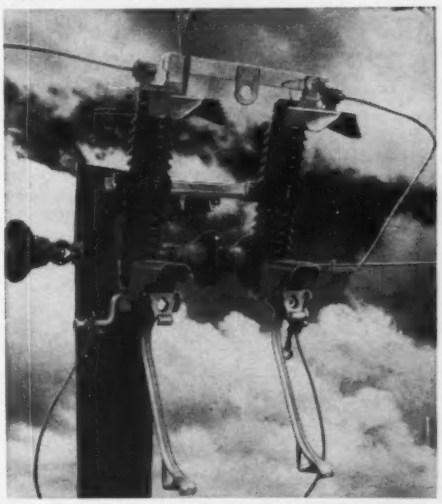
The recloser or regulator is now completely de-energized and may be safely removed from service.

Convenient regulator testing. A regulator may be tested after being replaced by closing the source-side disconnect. Having made this test, the load-side disconnect is closed, by-pass blade opened, and the regulator is back in service.

For more information, call your Westinghouse representative or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.

SPECIFICATIONS

Design voltage.....15 kv maximum
Continuous
current rating....200 amps maximum
Impulse strength....95 kv



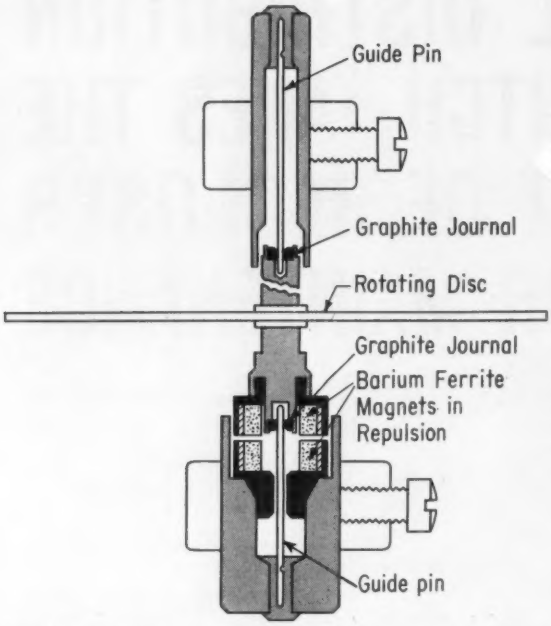
RBS By-Pass Switch in closed position, with disconnect blades opened, de-energizing equipment below line level. J-60999

◀ Single-phase installation of RBS By-Pass Switch and a GR-50 recloser.

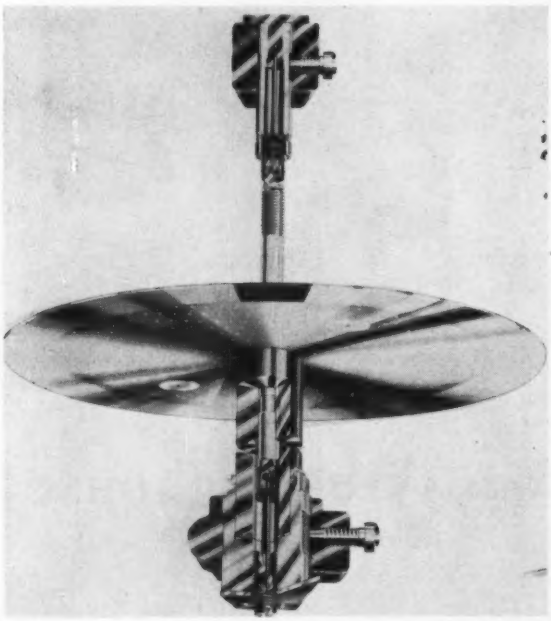
YOU CAN BE SURE...IF IT'S Westinghouse

TUNE IN WESTINGHOUSE-CBS TV-RADIO COVERAGE, PRESIDENTIAL CONVENTIONS, JULY 10-29

New Anti-Friction Watthour Meters Announced



'FRICTION-FREE' SHAFT of new Westinghouse watthour meter has magnetic-thrust bearing and graphite guide rings



'FLOATING SYSTEM' of Sangamo's new meter depends on Alnico magnets for thrust, includes end-shake stops

New watthour meters incorporating magnetic thrust bearings were introduced by two manufacturers last week to the AEIC-EEI Meter and Service Committee meeting at Madison, Wisc. Thus, with General Electric already in production on magnetic suspension meters, the industry swings toward new anti-friction designs.

Westinghouse Adopts Barium-Ferrite Magnets

Westinghouse announced development of a "frictionless" thrust bearing in which a magnetized barium-ferrite ring in the lower mount repels a similar ring on the meter shaft to "float" the rotating element on a 0.02-in. magnetic cushion. Both bearing magnets are die-cast into steel flux-return caps which concentrate the field and guard against external magnetic effects. The element is held in alignment by hardened chrome steel pins in the upper and lower mounts which project through "nearly pure" graphite journals pressed into the shaft's ends. Life tests are said to show no discernible wear after 100,000,000 revolutions.

The new design, said T. D. Barnes, shows shock and vibration resistance well above transit exposures, immunity to thermal and environmental changes, tolerance to off-vertical installations, and ability to serve at least 30 years without maintenance. It will be used in all single-phase meters rated 2.5, 15, or 30 amp at 120 to 600 v produced after June 1 and extended gradually to polyphase designs.

Sangamo Floats Disc on Alnico

Sangamo also introduced a magnetic flotation watthour meter which incorporates two cylindrical Alnico magnets to "float" the shaft in the lower bearing mount. One magnet is die-cast in the mount; the other on the shaft. The $\frac{1}{16}$-in. magnetic gap, which supports disc and shaft, repels magnetic particles and is always accessible for inspection. The shaft is held in alignment by cobenium pivots projecting through graphite rings in the shaft's ends. Adjustable Delrin thrust plates control end shake.

The new design also uses balanced pairs of Alnico damping magnets to minimize side thrust and extend guide-bearing life. Tests are said to verify compliance with MSJ 10, even to repeated surges of 20,000 amp on the neutral and 2,000 amp through the current coils.

Universal metering came a step closer with Sangamo's introduction of a polyphase meter with spilt current coils and dual-range potential coils connected to separate bayonet terminals. This meter, when used with its matching universal mount, can be connected to measure all types of service up to 300 amp and 480 v. Space is provided in the mount for encapsulated current and potential transformers. And the meter does not require re-calibration if its mount is reconnected for a different service.

(*Continued on page* 60)

NEW CHANCE ALL ALUMINUM TAP CLAMPS FOR HEAVY DUTY ALUMINUM-TO-ALUMINUM TAPS IN HIGHLY CORROSIVE AREAS

CHANCE "P. C." CC TAP CLAMPS FOR COPPER-TO-COPPER TAPS

CHANCE "P. C." AGP TAP CLAMPS FOR BI-METAL CONNECTIONS OR "P. C." AA FOR ALUMINUM-TO-ALUMINUM

THREE WAYS TO MAKE GOOD HOT LINE TAPS

The first step to making a good line connection is selecting the right and the best clamp for the type connection to be made—there's nothing profound about that—but there's something profound about the development of the product to meet the requirement. Chance engineers "dig much deeper"—go much further than you would probably think necessary to develop hot line clamps for various types of connections. Here are three examples of the best from their concentrated development work:

FOR ALUMINUM-TO-ALUMINUM HEAVY DUTY IN HIGH CORROSION AREAS. The new Chance All-Aluminum Heavy Duty Clamp is designed for use with the big conductors employed in today's farsighted construction projects. Except for one stainless steel pin, this husky clamp is made entirely of aluminum—ideal for aluminum-to-aluminum taps in areas where atmospheric contamination creates a problem with other clamps. Its complete compatibility with aluminum conductor prevents galvanic corrosion and also results in uniform thermal coefficients of expansion for maximum operating efficiency. A special "waved" main line contact gives good low resistance connections even on slightly oxidized conductors. The clamp handles conductors up to 397.5 MCM ACSR in both the main line and jumper terminals.

FOR COPPER-TO-COPPER, the Chance Bronze-Bodied S1520 "P.C." Hot Line Clamp is the newest development. This small clamp has a wide range from 1/0 std. to 8 solid copper main line or jumper. It is similar in design to all other Chance "P.C." clamps in that the clamp jaws hang on to the conductor without turning as the clamp is tightened and jaws are wide enough to make contact with all the outside conductor strands. And, like the larger clamps in this series, this clamp has excellent current-carrying capacity; low contact resistance. It will carry the maximum current allowed for the largest jumper wire without overheating any part of the clamp.

This new compact clamp is especially desirable for use with bail clamps to connect apparatus or equipment.

Kindred Chance bronze clamps are available for conductor sizes to 1500 MCM Stranded copper main line 300 MCM str. cu. jumper.

FOR BI-METAL - EITHER WAY—use Chance AGP Hot Line Clamps. These clamps are coated with high density, fortified cadmium that permits aluminum-to-copper, aluminum-to-aluminum, or copper-to-aluminum taps. The thick cadmium coating wards off corrosion and electrolysis in the connection. Thermal expansion of the clamp is compatible with aluminum conductors keeping contacts tight. And, since the thermal coefficient of copper is less than aluminum, copper conductors are not deformed even under extreme temperature variations. AGP Clamps in four sizes cover a range from No. 8 solid copper to 1500 MCM stranded and comparable aluminum sizes.

Some advantages, important to you, that all these Chance Hot Line Clamps have in common are the careful selection of alloys; the fine-grained heat-treated castings automatically controlled and continuously inspected in the manufacturing process; protected eye-screw threads that run in a chamber of all-weather corrosion-inhibiting lubricant; wide jaws for maximum contact, high conductivity; ample body for heat dissipation and resistance to heavy surges; strength to endure without mechanical failure and balance to keep down vibration fatigue and lengthen conductor life.

Another all-important step in making good Hot Line Taps is taken care of automatically when you buy Chance packaged clamps because z.l.n. 100 contact aid is factory-applied to the contact area. Printed on the sealing tape of each package is a reminder to clean and coat the conductor—when linemen heed this advice a good connection is virtually certain.

ABC INDUSTRIES

A. B. CHANCE CO.

CENTRALIA, MISSOURI

(A. B. Chance Company of Canada, Ltd., Toronto)

CC60-5

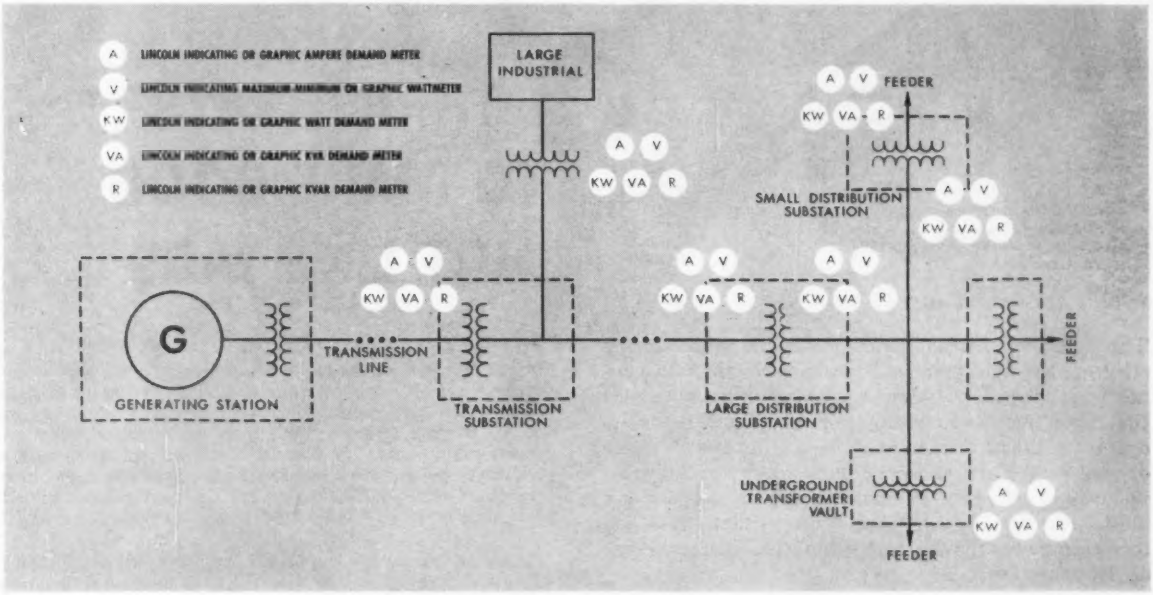
Advertisement

You can save engineering time with

PLANNED SYSTEM MEASUREMENT

How many times have you said, "We could certainly use a system measurement standard like that, but we just don't have the engineering time to set it up." But when you stop to evaluate the necessity of *facts* in designing and operating your distribution system efficiently, it is apparent that *only measured facts are known facts.*

A little engineering time directed toward planned system measurement will save a great deal of engineering time in the future. Your objective of obtaining a proper balance between adequate system reliability and minimum investment can only be achieved through complete knowledge of existing system conditions. Periodic surveys with portable instantaneous instruments are not the solution, since they are costly and do not provide complete continuous information. This information can be obtained only through planned system measurement. Lincoln meters do provide the most economical and flexible approach to a planned measurement program.



Planned Substation Measurement

Simplified measurement of system operation at your substations can be obtained by means of permanent switchboard installations of Lincoln indicating and graphic meters or by the use of meter sockets and the various Lincoln socket type indicating and graphic meters to measure amperes, volts, kw, kvar or kva. Lincoln indicating meters can supply maximum and minimum loading information while Lincoln graphic meters are utilized to obtain time of occurrence and duration of system conditions. The schematic diagram above indicates the flexibility of application that Lincoln meters offer for system measurements.

(V) Lincoln Voltmeters, with thermally averaged readings, give the best measure of regulated voltage that must be maintained for good customer service.

(A) Lincoln Ammeters provide the most economical means of obtaining important balance and maximum current load values, and give the averaged value needed to solve problems involving loading of the system.

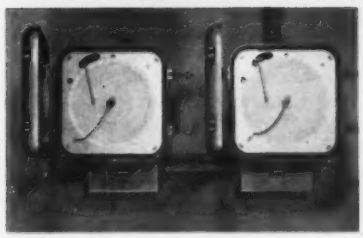
(W) (R) (VA) Lincoln kw, kvar and kva meters give an indication of present system conditions and provide essential information for long range planning. They are especially valuable in the application of power capacitors.

Sangamo has prepared a new brochure on "Planned System Measurement". Ask your Sangamo Representative or write direct for your copy.

Planned Substation Measurement can take many approaches

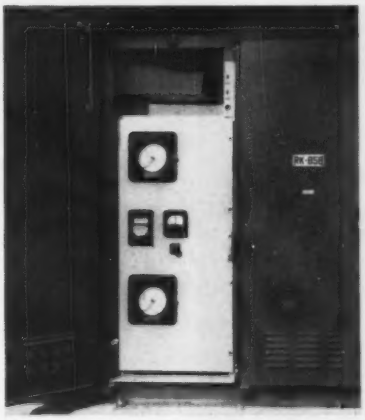
Here are a few examples

El Paso Electric Company utilizes three Lincoln AD service mounting ammeters (one for each phase) on the control side of primary transformers on 13.8 kv to 4.16 kv substations to determine load balance. A 3 phase kwhr and Lincoln thermal kw meter provide transformer loading information.

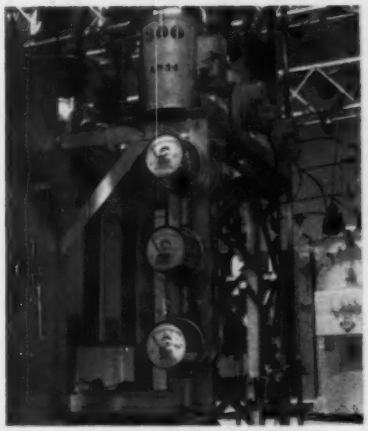


Consumers Power Company obtains detailed information on transformer conditions through the use of Lincoln indicating voltmeters and ammeters. Minimum and maximum voltages and minimum and maximum ampere loading information is obtained on each phase of a transformer. The indicating meters are also equipped with instantaneous voltmeters and ammeters. Use of three phase socket type Lincoln graphic wattmeters and varmeters for continuous measurement of transformer operating conditions completes this planned measurement scheme.

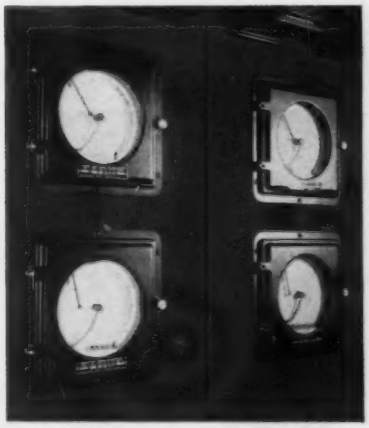
Duquesne Light Company standards call for installation of flush mounted switchboard type Lincoln graphic meters on substation transformers. A graphic voltmeter (top) records the voltage on one phase. Three graphic ammeters record ampere loading on each phase of the transformer.



Central Hudson Gas and Electric Company installs switchboard type Lincoln graphic varmeters and wattmeters along with a switchboard type Lincoln indicating voltmeter on transformers in substations. The meters are located on transformers to provide complete information on voltage and loading conditions.



West Texas Utilities Company uses a six socket arrangement (two sockets per phase) for feeder measurement in outdoor substations. The sockets are mounted back to back and are wired so that singlephase Lincoln indicating and graphic meters for measurement of volts, amperes, watts and vars can be inserted in any socket. Normally, three Lincoln indicating ammeters are installed. Three pairs of Lincoln graphic watt and var meters are periodically rotated from feeder to feeder and station to station for detailed load study and analysis.



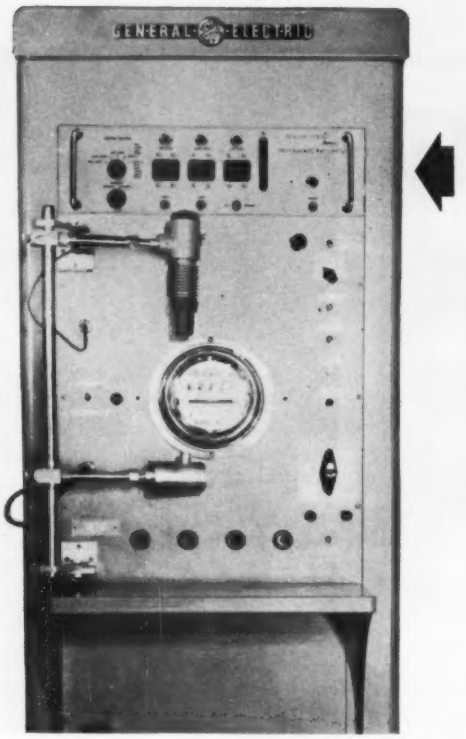
City Public Service Board of San Antonio installs flush mounting Lincoln graphic wattmeters and varmeters on each substation power transformer. The meters are installed in pairs to provide a complete and continuous record of the transformer loading, and for proper application of power capacitors. A similar pair of meters is used in conjunction with a selector switch on all 13 kv substation feeders.

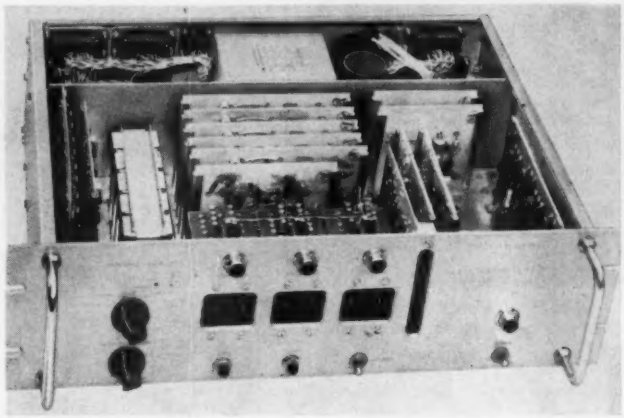
SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

SM60-3

Anti-Friction Watthour Meters Introduced (*Continued from page 56*)





COMPLETE REDESIGN of General Electric's electronic watthour meter testing unit applies static devices (above) to attain a higher level of readability and performance. Elimination of electronic tubes reduces the tester's power demands and enhances its reliability

GE Test Unit Uses Static Devices

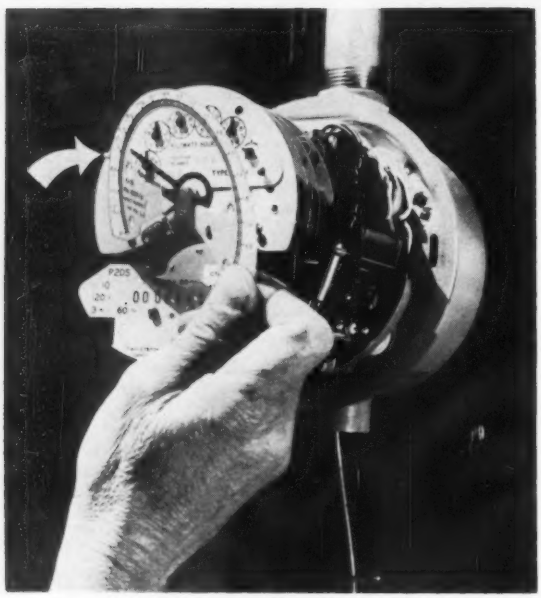
Automatic testing of watthour meters will require less space and power input, according to General Electric, with the new completely-transistorized electronic test unit. Other advantages claimed for the unit include a higher level of readability and performance and lower testing cost because all electronic tubes have been eliminated.

Dual-Range Demand Registers Get Automatic Shift

Availability of new dual-range demand registers was announced at the meeting by Westinghouse, General Electric and Sangamo. Each register is designed for use on all watthour meters in the manufacturers' standard lines. The range is changed by removing the demand scale and re-attaching it with the other side exposed. This scale change permits a spring-loaded gear shifter to introduce a correspondent change in the gear train.

The Westinghouse dual-range register incorporates a duplicate pushing mechanism to eliminate loss of demand registration during the reset period after each demand interval. This is accomplished by using the pushers for alternate demand periods, with a magnetic clutch transferring the drive function to the idle pusher after each period.

Demand metering has been extended by General Electric with a new impulse generator actuated by interrrupting light from an infrared source with a shutter disc driven by the meter shaft. The pulse picked up by a photo cell is amplified externally for transmission to a remote demand totalizer. Advantages claimed for the new impulse generator are reduced maintenance and friction loading, wide range of impulse rates, and elimination of false impulses.



TURNING OVER DEMAND SCALE releases pin (arrow) to change the gear ratio in Sangamo's new dual-range demand register. WE and GE also have new demand registers

(*More Procurement & Products, page 64*)

New LAMPLIGHTER

(Series 15,000)

Sets a New Standard for Photoelectric Lighting Controls . . . Meets Every Industry Requirement in ONE Control!

Here is an all-new, dependable, accurate photoelectric lighting control. Engineered to meet the industry's own requirements, LAMPLIGHTER (Series 15,000) sets a new standard. Exhaustive tests, including tests under extremes of temperature, humidity, moisture, vibration prove LAMPLIGHTER'S superiority . . . prove it is skillfully engineered and of rugged construction. In ONE control, LAMPLIGHTER brings you — externally adjustable light level from 1 to 10 ft-c., surge and lightning protection, ample time delay, twist lock base to fit all EEI-NEMA Standard receptacles, exterior ridges for easier handling and installation. Fail-safe, completely weather-proof. Fuse protection optional. The Acme Wire Company also manufactures a complete line of accessories to meet any mounting requirement. Low initial cost plus long life and easy maintenance make LAMPLIGHTER *the* control to meet *your* specific needs. Write . . .

The Acme Wire Co.
Utility Products Division, Dept. MP-1
New Haven 14, Connecticut

Luminaire or Slip Fitter Nipple Mounting

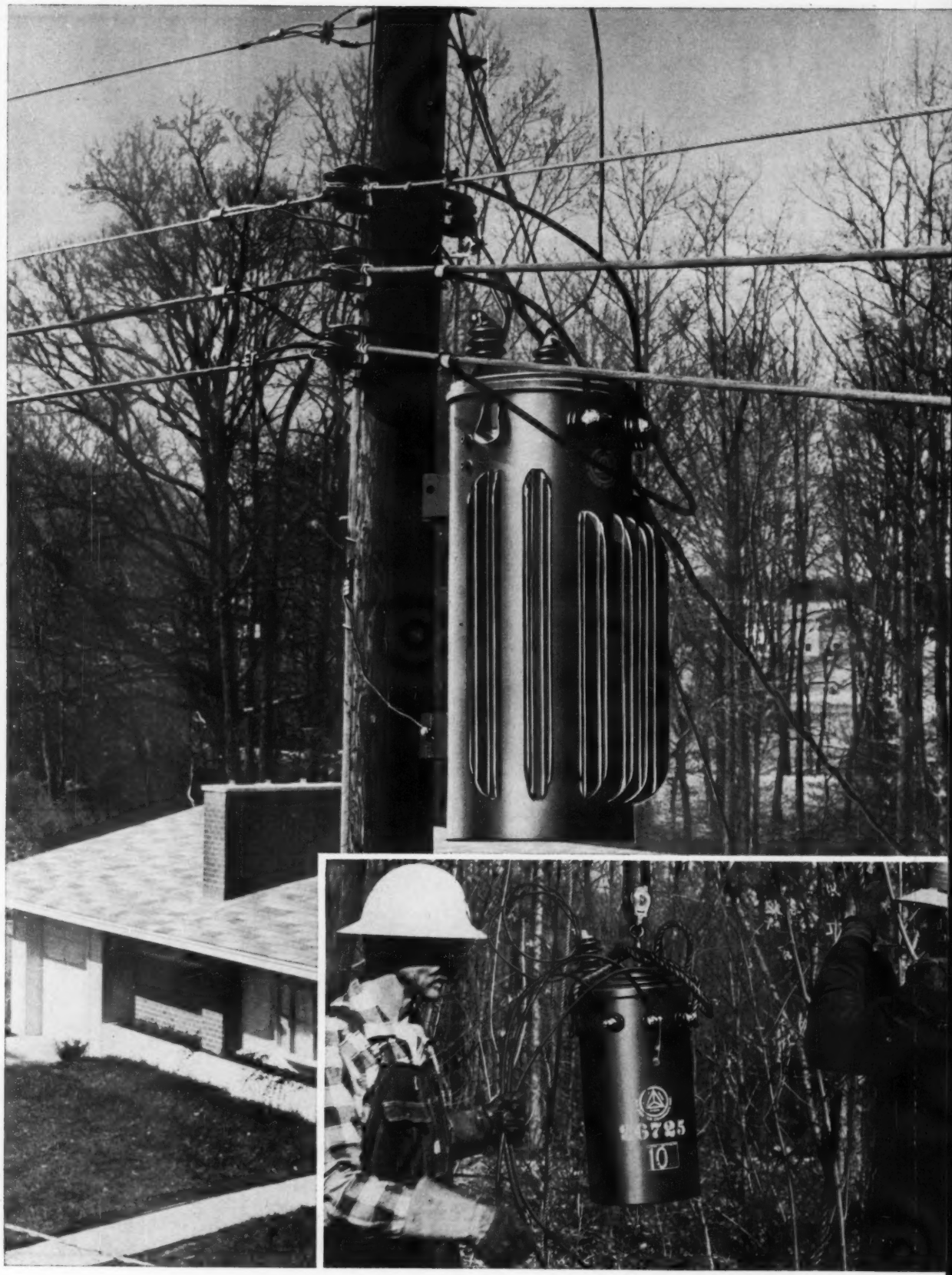
Luminaire Supporting Arm Saddle Bracket Mounting

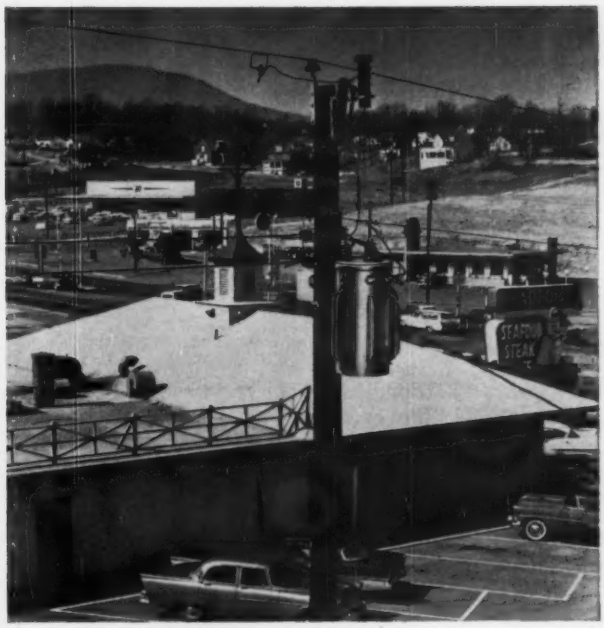
Watt Hour Meter Socket Conversion Adapter

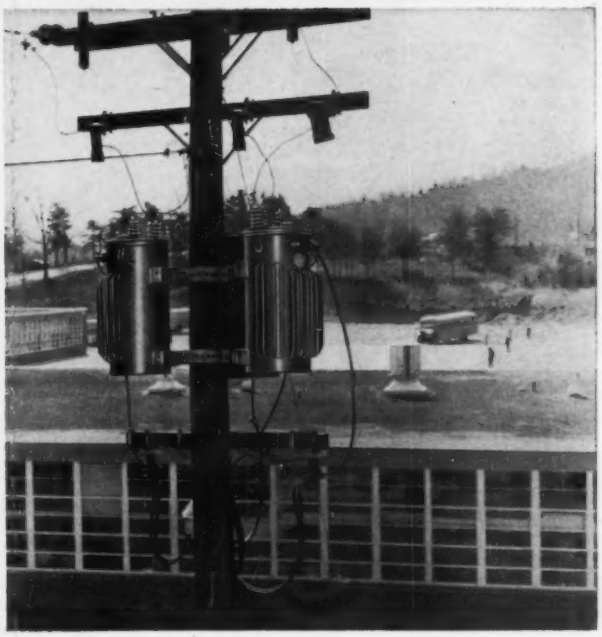
Adapter to Convert Form 110 Type Luminaire

Wooden Pole or Cross Arm Mounting

Pole Top Mounting







Up goes another new Delta-Star Distribution Transformer to help Appalachian serve its customers better. Wherever they're used, these transformers are satisfying the toughest service demands... at shopping plazas, schools, residential areas, industrial and commercial districts.

Delta-Star Transformers are Going Up all over the Appalachian System

Each year, more and more Delta-Star transformers are being installed by the Appalachian Power Company, which has headquarters in Roanoke, Va. They are servicing homes, schools and business districts. Wherever the location, the exceptional performance of Delta-Star transformers has more than measured up to all service demands.

Today, a growing number of progressive companies like Appalachian Power are using the heavy duty Delta-Star transformers to meet exacting service requirements under all types of weather conditions. Evidence of this is the increasing number of Delta-Star transformers that dot streets and roads throughout America.

When you need transformers, be sure to check into the Delta-Star line. For the latest illustrated catalogue write to: *Delta-Star Electric Division, H. K. Porter Company, Inc., 2437 Fulton Street, Chicago 12, Illinois.*

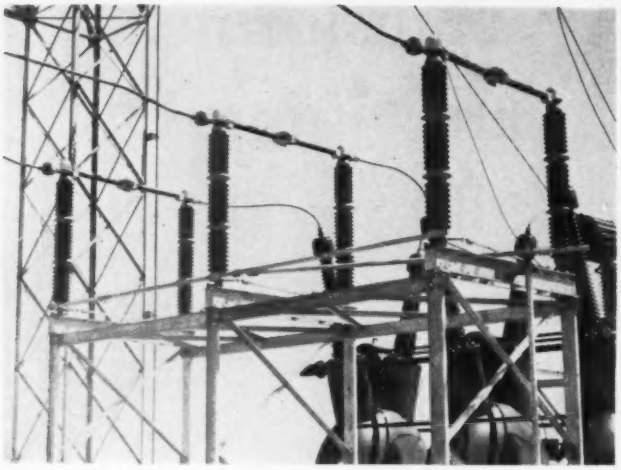
DELTA-STAR ELECTRIC DIVISION

PORTER

H. K. PORTER COMPANY, INC.

PORTER SERVES INDUSTRY with steel, rubber and friction products, asbestos textiles, high voltage electrical equipment, electrical wire and cable, wiring systems, motors, fans, blowers, specialty alloys, paints, refractories, tools, forgings and pipe fittings, roll formings and stampings, wire rope and strand.

(For further information refer to Readers Service on page 68)

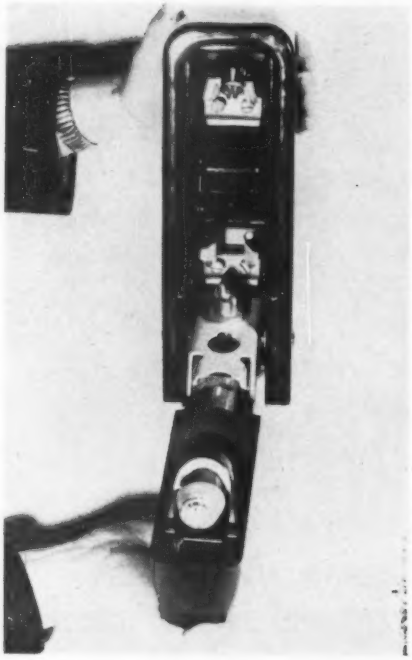


Air Switch . . .

. . . for 230 kv is rated at 1,200 amp. Type WT's smooth contours suppress corona, and cast aluminum covers shield hinge and contact assemblies against ice and corrosives. Amplitact contacts provide security under high fault conditions. The side-break WT line is also furnished in lower voltages from 34.5 kv and with continuous ratings of 600 and 1,200 amp.
Southern States Equipment Corp, Hampton, Ga.

Disconnect Switch . . .

. . . for indoor and outdoor switchgear rolls out for convenient maintenance. The rollout truck for 5 and 15-kv type P switchgear also holds fuses below the load-break disconnects. Positive-acting shutters isolate live parts to protect personnel when the truck is withdrawn. A spring mechanism insures quick make and break regardless of the speed of handle operation.
Allis-Chalmers Mfg Co, Milwaukee 1, Wis.

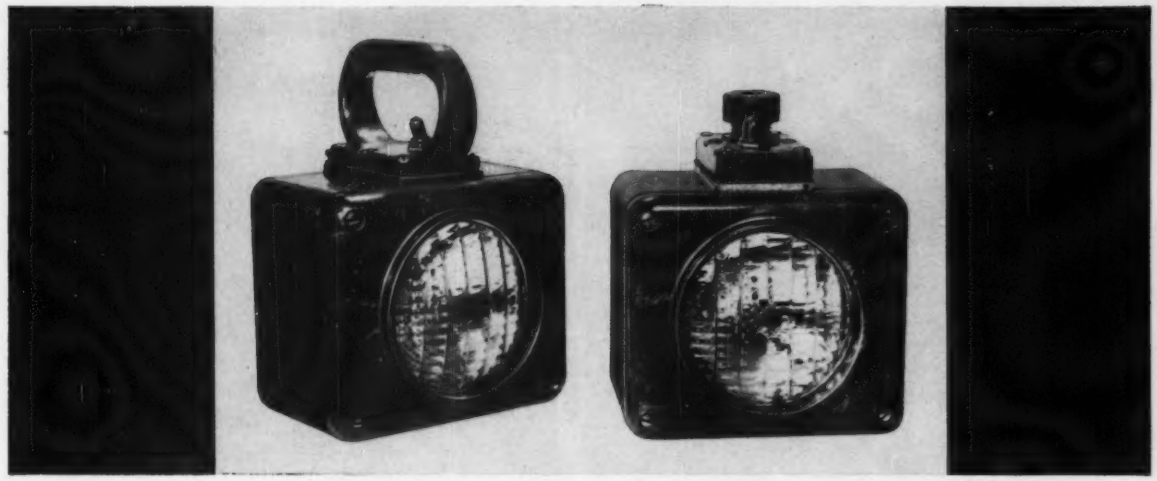


Cutout . . .

. . . for extra-heavy-duty service interrupts up to 14,000 amp, RMS asymmetrical, at voltages to 7.8 kv. Type EUH's porcelain assembly has been tested against severe thermal shock. The fuse tube, which accommodates fuse links to 100 amp, has a high strength glass epoxy outer shell for containing the high energy arc of interruption. Provision is made for either dropout or non-dropout operation.
Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pa.

(*More New Equipment on page* 68)

The New Roflan Electric Lantern Provides Maximum Safety for Maintenance Men



Here is a revolutionary, new emergency lantern for repair work, power plant maintenance, manhole inspection, submarine cable inspection and many other applications. The Roflan Electric Lantern is designed to provide maximum safety and offers these outstanding features:

- Asbestos-phenolic case combines high dielectric strength with rugged toughness.
- Non-metallic, fully insulated, waterproof, submersible, fungus resistant, rust proof and corrosion proof.
- Impact and shock resistant — has withstood 2000 ft. lb. shock tests with no effect on electrical or physical qualities.
- Recessed compartment protects lamp lens from easy breakage.
- Long shelf life, long capacity for use — tested for over 30 hours continuous use without battery change.
- Rectangular shape prevents lantern from being easily upset by vibration or jarring.
- Large size handle on portable model allows gloved hand to fit without cramping.
- Batteries held securely in fixed compartments — contact cannot be vibrated or jarred loose.
- No wiring to remove or connect when replacing batteries.

SPECIFICATIONS

Lamp beam	150 candlepower (approx.)
Current	0.5 ampere
Voltage	4.7 volts
Width	4¾"
Length	6½"
Height	8¾"
Lamp Contacts	positive, spring-loaded, butt type
Battery Contacts	positive, bar type
Batteries	6 volt, spring terminal type
Lamp	Automotive type sealed beam
Lamp type	Floodlight

(Spotlight type also available)

•

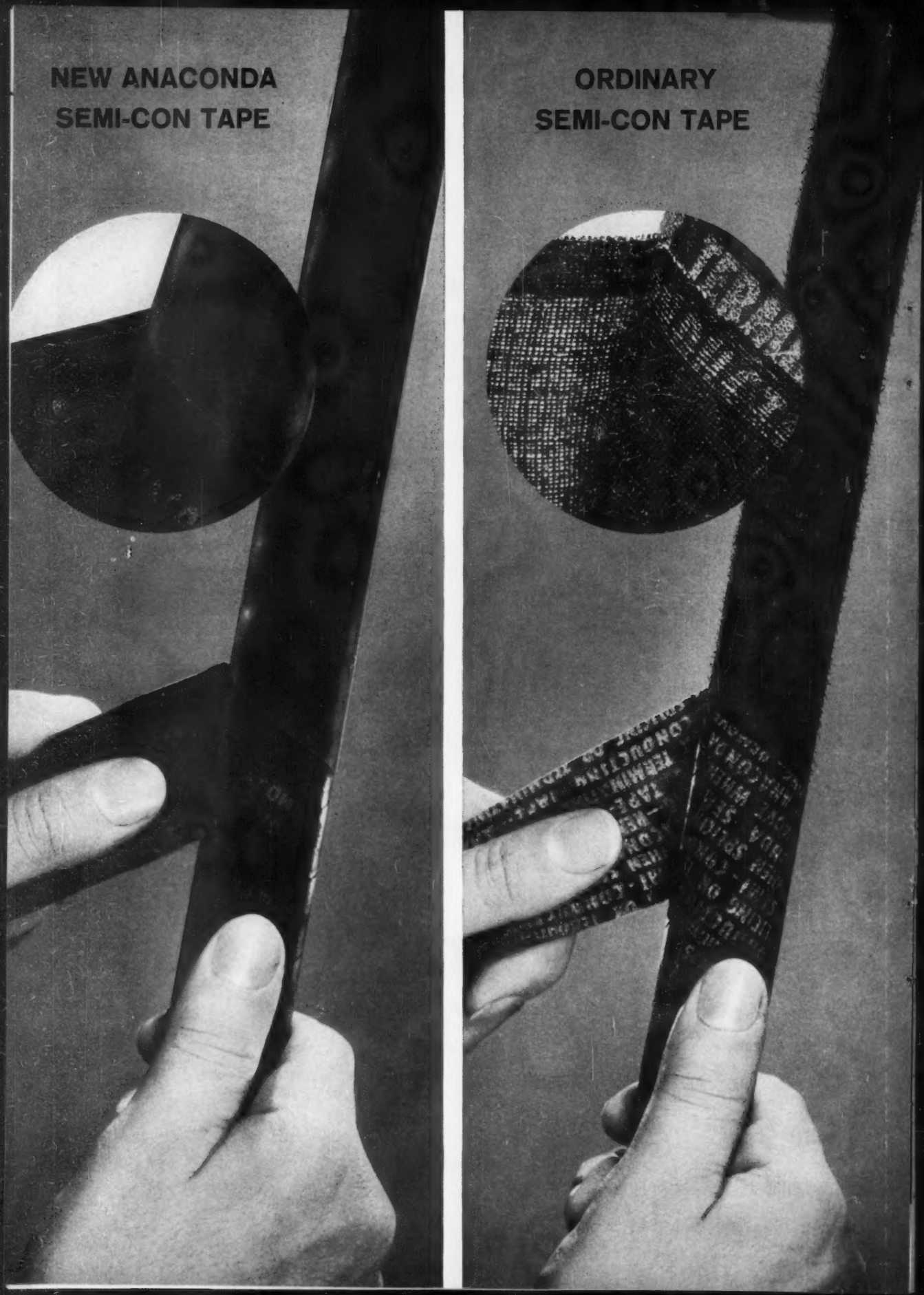
The Roflan Electric Lantern is available in a portable hand model, or in 115 VAC /DC and 230 VDC models for emergency lighting when power fails.

TRC Trade Mark Reg. USA

THE *Roflan* COMPANY • Route 1 • Topsfield, Massachusetts

Electronic Components

•


NEW ANACONDA
SEMI-CON TAPE
ORDINARY
SEMI-CON TAPE

NOW YOU CAN GET SAFER, FASTER, MORE RELIABLE JOINTS AND TERMINATIONS ON HIGH-VOLTAGE CABLE

Anaconda Durasheath has a new clean-stripping, semi-conducting tape

PROBLEM: To make a sound, safe, high-voltage splice, every last speck of semi-conducting tape material must be removed from the insulation . . . if traces remain, chances are the joint will eventually fail. But—this important step requires tedious scraping and buffing.

SOLUTION: The new Anaconda-developed *clean*-stripping, semi-con tape, which is an exclusive feature of Durasheath Cable. The photos (left) were taken immediately after semi-con tapes were stripped off the insulation. It takes much longer to get other cable insulation surfaces as clean. That's why this exclusive feature makes splicing a great deal easier.

The planned research and production program which brings you this outstanding cable development is also responsible for the equally important developments in Butyl rubber insulation compounding and extruding—which have produced the best possible balanced design and construction in high-voltage rubber-insulated cable obtainable today—Anaconda Durasheath.

For additional, more technical information about Anaconda Durasheath, write for Anaconda Bulletins, DM-5903, covering Durasheath High-Voltage Cable, and DM's-5566, -5720 and -5735, dealing with the splicing and terminating of Durasheath Cable. Contact your nearest Anaconda Wire & Cable Company district office, or write to 25 Broadway, New York 4, N. Y.

60239

ASK THE MAN FROM

ANACONDA®

FOR DURASHEATH® CABLE

Readers Service

For additional information on new products, supplies, and services in this issue, the Manufacturers Editor of Electrical World offers his facilities. Check items in which you are interested in list below:

NEW EQUIPMENT

Southern States.....Air Switch ☐
Allis-Chalmers .....Switch ☐
Westinghouse .....Cutout ☐
IBM .....Calculator ☐
General Electric....Safety Switch ☐
Industrial Instruments...Controller ☐
Anderson.....Stirrup Clamps ☐
Louis Allis.....Motor ☐

OTHER

_____

_____

Manufacturers Editor
Electrical World
330 W. 42nd St.
New York 36, N.Y.

* **Note: Requests must be received within four weeks of publication date, accompanied by complete information specified. This service cannot be offered to readers in foreign countries or to competitive manufacturers.**

NAME_____
TITLE_____
DEPT._____
COMPANY_____
ADDRESS_____

_____

_____

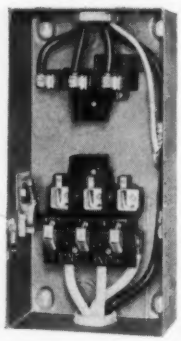
FOR:

Reference ..... ☐
Specs ..... ☐
Trial ..... ☐
Purchase ..... ☐

MAY 30, 1960

Calculator . . .

. . . for commercial and engineering use is programmed from wired control panels. Input and output are by 80-column punched cards, and the 609 calculator reads and punches 200 per min. The basic unit has a magnetic core storage that holds 20 twelve-digit words and which can be increased to 32 such words.
IBM Data Processing Div, 112 E Post Rd, White Plains, N. Y.



Safety Switch . . .

. . . puts line lugs at top or bottom. Enclosure can be installed with either end up. Line conductors can enter next to the line lugs and do not have to be looped through to the other end of the enclosure. The front keeps its conventional position, with red switch handle up for On, down for Off.
General Electric Co, Schenectady 5, N. Y.

Controller . . .

. . . monitors water purity. Automatic cycling multipoint conductivity controller has up to 12 separate points on one unit, which has its own built-in recorder. Model ARPT-315KA monitors condensate or demineralized water. Units are for flush or wall mounting.
Industrial Instruments, Inc, 89 Commerce Rd, Cedar Grove, N. J.

Stirrup Clamps . . .

. . . have stainless steel pins which fit over the main conductor to hold the clamp while it is compressed. Copper bail can be adjusted to any angle before completing compression. Series CPTS clamps are furnished for most main and copper tap sizes.
Anderson Electric Corp, Birmingham 1, Ala.

Motor . . .

. . . is cooled by air-to-air tube-type heat exchanger. Tube-Cooled motors to 2,000 hp operate in unfavorable environments and protect against moisture, oil vapor, chemicals, dust, dirt and metal particles. Explosion-proof and standard construction are furnished.
Louis Allis Co, 427 E Stewart St, Milwaukee 1, Wis.

Get More From Your Account Calls

Report on
Customer Relations

A sharp, unexpected change in a customer's kwhr use can be a symptom of numerous ills. Quite often it should be looked into, and is, by the utilities. This involves a customer contact, and a rare opportunity to build goodwill. If effective, a personal contact can go far to erase the notion that a utility is a cold, disinterested, public steward. But it is important that it be handled properly, for there are pitfalls. Here's an example of successful results one utility has had with an inexpensive bill auditing program, according to E. G. Poole, commercial consultant with Seattle City Light.

• **An office machine company moved into a new building,** leaving an old one with a six month lease remaining. In an audit the utility noted zero consumption on the meters. It notified the company manager, who was delighted to hear that he did not have to continue paying out his minimums as he supposed. Eventually, of course, he might have found out for himself. But the utility caught it first, to its advantage. He was grateful, and feelingly expressed it.

• **An advertising sign showed zero use.** Trouble: a defective time-switch contact. The utility spotted it and notified the owner, whose place of business was miles away. He might not have noticed his sign was dark for months, or more. The owner was thankful, and thoroughly impressed that the utility could have gone on collecting its charges without supplying service—but didn't.

These aren't isolated cases; hundreds like them come up every month, Poole notes, in factories, homes and offices. A utility has a tremendous service to render, and an immense amount of goodwill to win—if it slants the program to extract optimum benefits. This, though, is no easy matter. The problems can be complex, and so can the customers. Customers are generally grateful for such care and service. But they are also naturally suspicious of "giveaway" motives, and sometimes irrational.

For one thing, a contact must never, ever, be perfunctory. If it is, here is what might happen. Seattle City Light discovered two meters that were wired in series for the upstairs and downstairs sections of a duplex apartment. The owner had been paying duplicate bills all along, and never knew it. He was notified that he had a $200 credit coming. Of course, he was glad. But was he satisfied? Not at all; a month later he phoned and complained the bill on the corrected meter was still excessive. He was still being "cheated," or so he imagined. Here, he had simply not been approached in a way that created a lasting and favorable impression.

The next time a similar case came up, though, it was a different story. The customer, unaware, was approached as though he had won an Irish Sweepstakes; the plumb was dangled, but not revealed. During a leisurely chat, the utility's image was established as a "guardian angel," constantly, silently, watching over his account. The customer was impressed, and showed it.

When residential customers are on the borderline between standard and quantity rates (which are optional) the utility tries to advise them. And here again, Poole cautions, a blunt approach can kill the desired effect. The customer may appear at his door, snarl that he's paid his bill and wants to be left alone. Thus, he should be approached almost apologetically, and be told the utility merely believes it can lower his bill a bit. Before telling the customer of the differences between so-called monopoly and competitive businesses, the "guardian angel" concept should be brought out dramatically, perhaps along these lines: "Can you imagine a department store scanning your account and telling you that you could have bought identical items for less in its bargain basement? . . . Or that your oil company, scanning your credit card account, would inform you your car would run just as well on regular gasoline as it does on the premium grade that you buy?" This jolts him. The story bites in, and it spreads.

But a utility can go too far, Poole has found. Guard against these two pitfalls. (1) Don't build the company's image at the expense of the customer's dignity. He might have discovered the facts you are reporting himself. Just mention that his engrossment with personal and business affairs has probably not left him time to attend to this matter. (2) Never make the company out as too charitable. The customer may doubt the utility's ability to manage itself.

Significantly, a program like this costs little and benefits all. Seattle City Light has about 20 field consultants on the payroll, each covering his own area. They manage to sandwich these special calls (which are first scheduled when accounting machines flag an unusual or suspicious bill) between routine calls. Each field man makes about 30 of these special calls each month, which accounts for about 10% of his time. And even that figure may be too high; many of the calls would have been made eventually as a result of complaints or requests for new service. Thus the cost is nominal (perhaps 5% or less of a field man's time) and the utility gets the jump on the customer before he knows of a troublesome situation.

Specifically, a bill audit and investigation might turn up an unreported space heater—a widespread load in the Seattle area. When it learns the facts, the utility can service the account by ordering a five-dial meter, change the billing from the usual bi-monthly to a monthly cycle, and pick up the load data—all in one stop. At the same time, the field man can talk up service features, energy costs, and good usage practices at the most timely moment. Invariably, the customer is profoundly impressed, Poole notes.

Other examples come quickly to mind. Often a check will show a bill has been distorted by abuses, human or mechanical, of electric hot water heaters. Here, leakages, circuitry quirks, and the pitfalls of do-it-yourselfers are usually

analyzed and corrected quickly and effectively. Similar and equally significant cases involve foreign loads on a customer's meter, meters reset to run backwards, grounds on customer's wiring systems, services left on loop, even landladies with hot plates and portable heaters being used voraciously by her roomers, or, as just recently, the little lady pensioner with a deep freezer that was running continuously. There are tremendous opportunities for building goodwill here. And like a beam of light, Poole points out, goodwill spreads and spreads.

Where Does Executive Time Go?

Report on
Executive Efficiency

Most executives bemoan the fact that they have more work to do, and more people to see, than they can possibly cram into a single workday. Where does their time go? How can they make better use of it? A new book, just off the American Management Association press, probes the heart of such questions; *Organizing Your Job in Management,* by Carl Heyel. Heyel offers no miraculous gimmicks to add hours to your workday. There aren't any, he believes. His thesis—a time problem isn't a surface problem at all. It's a symptom of more serious problems lying deep within the executive himself.

Most executives are working harder than ever before. AMA studies show it's not uncommon for presidents and vice presidents of companies to put 62½ hours a week into their jobs, including work they take home in the briefcase. And these figures are buttressed by a survey of the Young Presidents Organization that showed the average workweek in the office was 53 hours—not counting a heavy load of evening and weekend homework.

Weary executives could list many causes for their long hours; poor conference techniques, ineffective communications, and improper reading habits. But topping almost anyone's list would be faulty delegation, the major offender. Almost everyone, of course, is for delegation. The ability to delegate is mentioned time and again by company presidents, Heyel points out, as the basic requirement of a good executive. Most executives would agree. And most are firmly convinced

they know how to delegate, and are now delegating—to the maximum extent possible. Here is precisely the problem; the feeling that special features of a job actually rule out delegation. Quite often, it simply isn't true.

"The essence of good management is not to do the job, but to get it done," Heyel says. The manager who fails to see this fails to delegate effectively. And very often lying behind his attitude are fears, deep within. The solution lies in some honest soul-searching to bring them out where they can be dealt with. They are very real fears—but quite often absolutely groundless. Here are seven common ones:

(1) The fear of being "found out;" often the problem of a young executive who feels inadequate. He thinks he should know more than all his subordinates, and that top management expects him to. This is impossible. He controls too tightly, bogs down in detail, losses perspective, and creates a bottleneck. (2) Some executives have an overdeveloped sense of perfection, which leads them to set impossible standards for subordinates, who, in turn, "must" have all their work checked. (3) Other executives have a lack of confidence in others, which may grow out of an egotistical sense of superiority. But it may also grow out of a feeling of inferiority, in which case an executive may truly surround himself with mediocre lieutenants, just to make his own star shine more brightly.

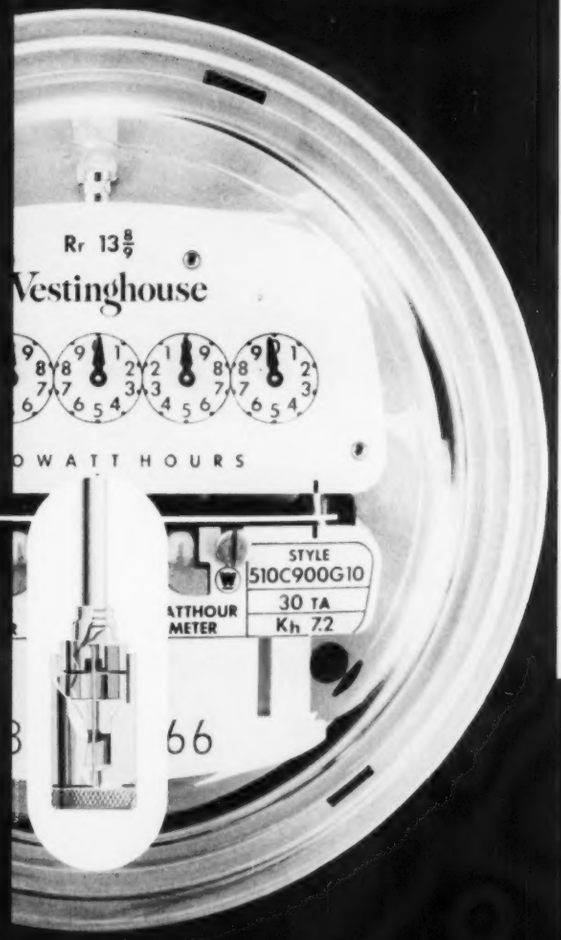
Other fears are more obvious. (4) Some executives are reluctant to admit to themselves that someone else may know more, thus they fail to draw on special talents lying within reach. (5) Then there is the fear of not getting credit for the work of the department, and (6) the fear that a subordinate may move ahead too fast. Finally, (7) there is "softness;" a basic fear of being labeled a "bad-joe." This executive may be afraid to ask his subordinates to shoulder their fair share of the department's workload—and winds up taking work home almost every night.

Faulty delegation, of course, is not the sole time-waster. But it, with all the others, helps cause tension and worry; both time wasters in themselves. A sizeable proportion of executives, perhaps 35% to 40%, suffer from significant tensions. A little tension, of course, is a good thing—but too much tension on the job dulls the quality of an executive's work, and his efficiency. As a matter of fact, some psychologists believe worries and tensions hold the typical executive's performance down to about 50% of his potential efficiency. Most of these tensions result from being too conscientious, from feeling inadequate, or guilty.

With pressures bearing down, an executive may find himself sucked into a vicious time-trap. He puts in longer hours just to keep up with his daily routine, which leaves less time for planning. Lack of planning may tend to make him work from crisis to crisis—each one eroding away still more time. Paradoxically, to climb out of this rut he will have to spend even more time to organize himself and his job. But, as Heyel points out, nothing comes easily. As with money, it takes an investment of time to gain still more.

Heyel spends most of his book developing a long-range, systematic cure for executives who suffer from such ills, to one degree or another. It begins with an honest self appraisal to determine just how serious the problem is. A written, two-week audit of where time really does go is the all-important next step. This gives data to work from, and an insight into whether the problem is really with the job, or with the man. Lastly, a written plan is drawn up which includes both short and long term goals. This book is full of facts and was written by a man who is an experienced engineer and executive himself. You can read it in two evenings. Recently appointed executives, in particular, should find it helpful. (*Organizing Your Job in Management,* American Management Association, 203 pp., price $5.25, $3.50 for AMA members).

Now! the Better Meter you dared us to build... New MAGNETHRUST by Westinghouse



For some time it has seemed unlikely there would be any further improvement in the accuracy of watthour meters. Judging by the record of our own D line single-phase meters for accuracy and dependability, we almost agreed. But not quite. The product of our willingness to accept the challenge—to design and build an even better meter—is announced in this message. Its name is MAGNETHRUST*.

*Trade-Mark

NEW MAGNETHRUST—PRODUCT OF 15 YEARS OF MAGNETIC BEARING RESEARCH

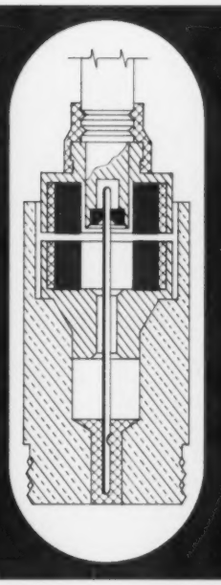
At the heart of this new Westinghouse meter is a revolutionary bearing system employing magnetic thrust, made practical for the first time by the use of an outstanding permanent magnet material—barium ferrite. Only known magnetic material to show no change at maximum magnetization without normalizing.

In the new MAGNETHRUST meter, the disc and shaft actually float on a magnetic field. With this new principle, Westinghouse adds new areas of perfection to already impressive standards of meter performance.

The MAGNETHRUST meter is tamperproof . . . no known service conditions can demagnetize the barium ferrite magnets. High ambient temperature has no effect whatever on the MAGNETHRUST meter. *These are exclusive advantages.*

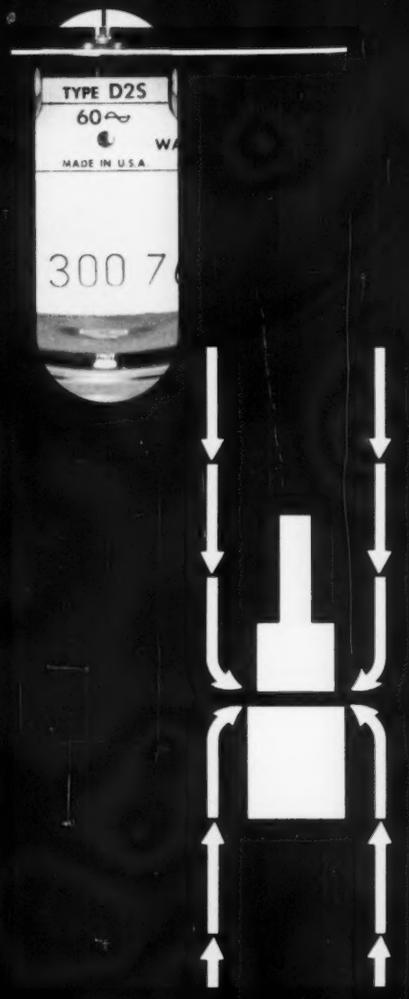
The bearing system is designed for minimum vibration and bearing pressure, offering quiet operation and a lifetime of service. Barium ferrite provides high magnetic energy to permit smaller, lighter magnets and extreme resistance to demagnetization that assures extraordinary stability.

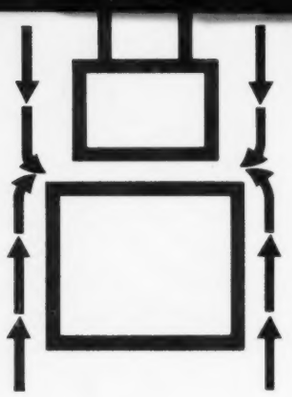
Now, over a half century of meter bearing research brings you new measures of operational perfection and revenue protection you can get in no other meter.

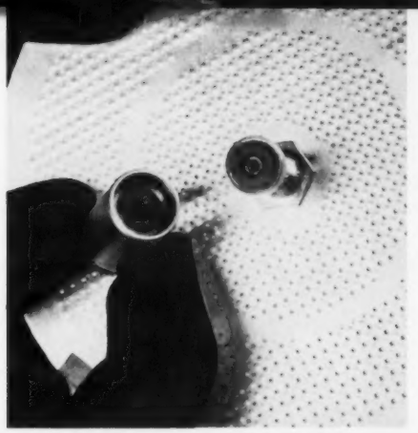


YOU CAN BE **SURE**...IF IT'S

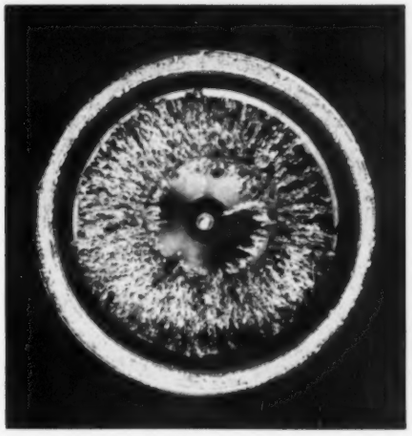
Westinghouse







NEW MAGNETHRUST BEARING . . . floats on a magnetic cushion, never wears, lengthens useful meter life.



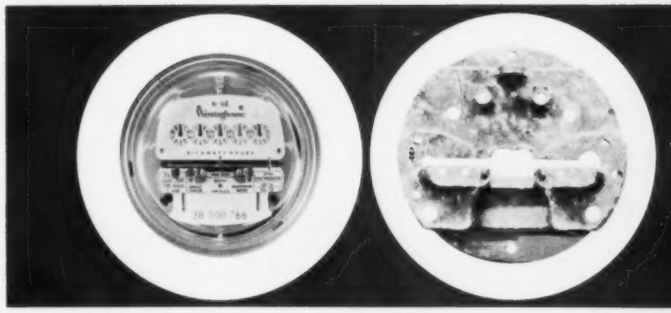
SELF-CLEANING BEARING . . . note how iron filings thrown on the magnet face lie flat, cannot clog the bearing.

Superior stability provided by MAGNETHRUST

Two ring-shaped barium ferrite magnets are the heart of the new Westinghouse MAGNETHRUST bearing. These are mounted in steel flux return cups. One is located in the lower mount and the other on the bottom end of the disc shaft. Facing surfaces of the magnets are magnetized north. The result is that exposed magnet faces oppose one another. . . the disc and shaft actually float on a magnetic cushion.

This bearing arrangement is highly reliable and permanent because the magnets themselves are inherently stable. They resist demagnetization when subjected to any external magnet or surge current including lightning. The bearing system is self-cleaning . . . magnetic particles cannot clutter the gap.

Ask your Westinghouse representative for a demonstration of this truly new principle of meter design. Or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.



MORE THAN DOUBLE CORROSION PROTECTION . . . all parts have finishes which are tested separately and together by immersion in sea water, exposure to salt spray, dry and moist atmospheres up to 100% humidity.

TRUE LIGHTNING PROTECTION . . . exclusive De-ion® arrester gaps discharge lightning harmlessly, outside the meter to ground. Alnico damping magnets tested for lightning surges to 40,000 amperes.

YOU CAN BE **SURE**... IF IT'S **Westinghouse**

JI-40531

Litho in U.S.A.

Jersey to Get 6,000 Gold Medallion Homes...

. . . in one project. 'Electric City USA' will also have 5,000 all-electric apartments, shopping center. Cost: $190 million

The chance to "live today in the city of tomorrow" will be offered to some 30,000 people in a New Jersey community within the next five years. Through the cooperation of Jersey Central Power & Light Co, General Electric Co, and W. J. Happell & Co, development firm, a $190 million "Electric City USA" will go into construction in the next few months. Homes, all of which will be awarded Gold Medallions, will be priced from $12,990 to $24,990, and will feature electric heating and cooling and all-electric kitchens.

The 2,500-acre community will have 6,000 private homes, 5,000 Gold Medallion apartment units, a 100-acre industrial park, shopping centers and schools.

A selection of model homes will be completed by Labor Day, with 500 done by the first of next year. An exhibition building will be completed first, containing demonstrations of construction methods and building materials, and electrical and mechanical equipment that will be used in the Medallion Homes.

"We are determined to prove that higher priced homes completely equipped for luxury living can be built without increasing monthly housing expenses," W. J. Happell Jr, president of the development firm, told a press conference at New York's Park Lane Hotel, May 19.

"By spending a few more dollars per home in full insulation, vapor seal, double glazing, we can save the homeowner the additional first cost many times over in operating expenses throughout the life of the house," he said.

Under questioning, Happell revealed that no mortgage commitments have been obtained on the project. He indicated that financing arrangements would be through "several big New Jersey and New York banks."

General Electric Co's manager of the Residential Market Development Program, George Bogard, said that "neither GE nor Jersey Central Power & Light was involved in any of the financial arrangements."

"The plain and practical truth is that electric house heating enhances the value of a home because it is modern today and will be modern tomorrow," was the opinion of Jersey Central Power & Light Co's President C. E. Kohlhepp. "Electric heat is as safe and quiet as an electric light," he said.

"Electric City" will have overhead service, according to Kohlhepp. However, Charles Tegen, chairman of General Public Utilities, the holding company controlling Jersey Central P&L, said "We will go underground if it is economically feasible, and right now, it isn't."

Although Kohlhepp indicated that no rates had been worked out for the all-electric community, he expected the average residential bill to be about $275 a year, compared to $85 for a non all-electric customer.

Appliances Show Well in Consumer Buying Plans Survey

The problems last fall of the appliance industry, brought on by the steel strike, have now abated, and things are looking up. In fact, buying plans for all major appliances, except TV and clothes dryers, are up above year-ago levels. This was discovered in *Newsweek* magazine's Survey of Consumer Buying Plans, conducted by the National Industrial Conference Board. It covered the first quarter of this year.

Also, buying plans for five of the nine appliances surveyed were higher in March than at the start of the year.

The star of the spree was vacuum cleaners, which gained a full 20% in the first quarter after more than a year of decline.

Here are six-month buying plans for major appliances:

Air conditioners are running just over 1959 levels. A spectacular advance was recorded in December and January, attributable in part to heavy promotion by manufacturers urging customers to buy before the new excise taxes upped the price.

Dishwashers topped year-ago levels by 23% in January, and 17% in March.

Ranges were off from 1959. Manufacturer sales were down slightly, but actual retail sales fell off more seriously. However, buying plans took a quarter-to-quarter jump, promising an upturn in sales, according to the report.

Refrigerator sales are running slightly ahead of last year. Buying plans were up 24% over 1959.

Washing machines, which were down during the fall, surged in the first quarter to top 1959 figures by 8%.

Freezer purchases ran well below 1959 in the first quarter, but buying plans are slightly above the year-ago level.

Other items of interest in the *Newsweek* report:

- Plans to purchase new homes gained 4.5%; to buy older homes, 3.8%. Compared to last December's figures, new home buying plans increased 20%.
- The Midwest showed the biggest boost in buying plans of any region in the first quarter; the Far West the smallest.
- Consumers with incomes of over $10,000 were less inclined to step up their spending than lower groups.

(*Continued on page* 78)

• Women are inclined to be more pessimistic than men about the business outlook.

The report concluded: "The main spending trend shows no sign of splurge nor any sign of retrenchment; it is exerting the same moderate, bolstering force on business as a whole that it has for several years in the past."

One appliance manufacturer, however, was pessimistic. He said, "The results (to date) are undeniably disappointing when measured against the earlier optimistic forecasts."

PG&E Adopts Reddy Kilowatt Symbol

Pacific Gas & Electric Co and Reddy Kilowatt have joined forces. The cartoon character symbol will be used in PG&E promotion and advertising beginning next October.

Programs for application of the Reddy Kilowatt figures in printed or televised matter will be set up by A. J. McCollum, manager of advertising and publicity, and for use in sales promotion by O. R. Doerr, vice president in charge of sales.

Vice President Robert R. Gros said that PG&E employees and industry allies will be made acquainted with Reddy Kilowatt and his role in the company's promotional and customer relations activities before the first published use of the symbol.

Stoves of Yesteryear Help Utility Sell Modern Ranges

Columbus & Southern Ohio Electric Co recently turned back to yesteryear to call attention to the values of today's electric ranges.

In a three-page newspaper ad, the company reproduced a wood-coal burning stove as the "Housewife's friend—durable and cheap . . . a positive success . . . improved . . . up-to-date . . . tested by thousands."

At the bottom of this tongue-in-cheek advertisement the electric company asked readers to turn the page and "select your modern electric range" and pictured 11 national brands.

The double-page spread following was in green, white and black with an invitation to the housewife to move ahead and learn the joys of cooking with a "cooler, cleaner, quicker electric range."

Tacoma City Light Offers Service Entrance Plan

Homeowners installing 200-amp and 240-v service will receive subsidies from Tacoma City Light under a program approved by the Public Utility Board.

Utilities Director Dean Barline said the purpose "is to provide a new house with a large electrical load, so the owner won't have to face the heavy cost of rewiring his house for a new dryer or electric water heater."

The schedule of reimbursement for a trial program ending July 31 calls for $30 for 200-amp service with 25 kw connected; $40 for 30 kw; and $50 for 35 kw. The offer applies to single-family residences only. The program is in part designed to meet the competition of the local gas company, which allows a changeover from electricity to gas for only a small service charge.

Heat Pump Use in North Increasing, Carrier Says

Widespread use of heat pumps in Northern climes during the next 10 years has been predicted by Charles V. Fenn, vice president of Carrier Corp.

He said that recent developments in office planning and in heat pumps make it both practical and economical for these systems to use excess inside heat to warm entire buildings. "It is no longer necessary to confine heat pump marketing efforts to mild climates . . . " he noted. "The wider use of modern, intense lighting and business machines, plus the fact that air conditioning permits more people to work comfortably in less space, have created new sources of heat."

PMC
FIELD
PROVEN
CONTROL
OVER 250,000 INSTALLATIONS!
A complete line of precision photoelectric controls & accessories for outdoor lighting.
PRECISION MULTIPLE CONTROLS., RIDGEWOOD, N. J.

SELLING BRIEFS

Commonwealth Edison Co has produced two booklets on **electric house heating.** One, "Electric Home Heating Is Here!" tells of benefits of electric heating, types of systems, guides to insulation, and installation costs. The other, "Heat Your Home The Way You Light It . . . Electrically" also covers types of units and cost but also details why electric heating will be preferred from the man's angle and the woman's viewpoint.

Sunday is the most popular day to look at **model homes,** and most people prefer Sunday afternoon to evening, according to *Living for Young Homemakers'* newsletter, Housing Trends.

Collapsible **electric clothes dryer** is now on the market. Made by Wonder-Fold Home Dryer Co, unit is standard size box shape, 36 in. high, 26 in. wide, and 26 in. long. After use, front of dryer can be retracted from its 26-in. width to six in.; can be wheeled on casters under a bed or into a closet.

New line of ceiling-mounted residential **electric heating equipment** has been introduced by Westinghouse Electric Corp. It includes a heater-light-fan unit combining in one device a 1,200-w heating capacity, two 60-w lamps, and a 175-cfm fan. Compact heater-and-light 1,200-w unit, using two lamps; and 1,000-w unit with heater are also available. All models have built-in thermal protection devices that prevent over-heating.

First **electrically heated home** in Western New York was constructed nine years ago. Recent Niagara Mohawk Power Corp figures show 654 electrically heated homes in Western N.Y. counties. Company predicts 1,000 electrically heated homes in area by next year.

Third Biennial **Electrical Trade Conference and Exposition** is scheduled for Washington next February 14-16. Show will offer manufacturers chance to show latest equipment, materials and services. Show will also tie in the National Electrical week.

. . . an outlet for electric heating?

Sure. Nucla, Colorado is a small town in Montrose County, almost due north of Naturia (another small town), and a little bit south of Tabeguache Creek. It's cattle country. There are only 457 people in Nucla. One of them sells Electromode Heaters. To help, we promote electric heating there, too.

Odd? Not at all. We sell heaters in Steamboat Springs, Colorado; Orem, Utah; Yoakum, Texas; and Chilhowie, Virginia, too. You'll find our heaters in stores sitting on one-car-a-day crossroads as well as in human beehives like New York or Chicago. We sell them all over the U. S. through thousands of outlets—distributors, electrical contractors, and manufacturing agents. It means product availability, product acceptability smack across the land.

WHERE we sell—as well as what we sell —has helped to make Electromode the most popular line of electric heaters. If you have any questions about our distribution, products or promotions, write us. We'll be glad to answer them.

® Electromode

DEPT. EW-50, Division of Commercial Controls Corporation, Rochester 3, New York

Olson Named President of Kansas City P&L

Robert A. Olson has been elected president of Kansas City Power & Light Co. He had been vice president and secretary since 1957. Harry B. Munsell, who had been president since January, 1947, was named chairman of the board. Kenneth G. Hovland was elected vice president and treasurer of the Missouri utility.

OLSON MUNSELL HOVLAND

Olson joined the utility as secretary early in 1947, after 12 years of legal and financial work with the United Light & Railways Co, a utility holding company. He was named secretary-treasurer of Kansas City P&L in 1949 and vice president and treasurer in 1955. He has served as a director since 1950.

Munsell came to the Missouri utility in 1945 as vice president and secretary. Not quite 42 years of age at the time of his election as president, he was one of the youngest executives to head a major utility in the nation.

Hovland joined the company as assistant controller in 1947. He was made assistant treasurer in 1955 and treasurer in 1957.

NSP Makes Furber a Vice President

A 36-year veteran with the company, J. Roscoe Furber, has been elected a vice president of Northern States Power Co. He was also named manager of its Minneapolis Division.

Furber had been general sales manager for the past 12 years. He worked as a sales engineer after joining the company until 1942 when he was made manager of the municipal and resale section. He held this post until he was promoted to general sales manager.

Both an engineer and an attorney, Furber was admitted to the Minnesota Bar and to practice in the US District Court. Twice, in 1946 and in 1948, he won the Minnesota State Bar Foundation Scholarship award.

Kropp, Scott Named VPs at Union Electric Co

KROPP SCOTT

E. R. Kropp has been named commercial vice president and H. R. Scott, regional vice president, of Union Electric Co. Merrill E. Skinner, vice president and director of sales, has retired.

Kropp has been with Union Electric for 37 years. After serving as assistant secretary, he was promoted to assistant to the president in 1948, and vice president-general administrative in 1952.

Scott had been regional manager of the company for the last 10 years. He joined UE in 1933, and became a buyer in the purchasing department in 1940. In 1944, he was made assistant to the manager of the East St. Louis Division, in 1946, manager, and in 1950, regional manager.

Thomas Named Manager of GE Power Plant Operation

Charles C. Thomas has been appointed manager of a newly formed power plant engineering operation at General Electric Co.

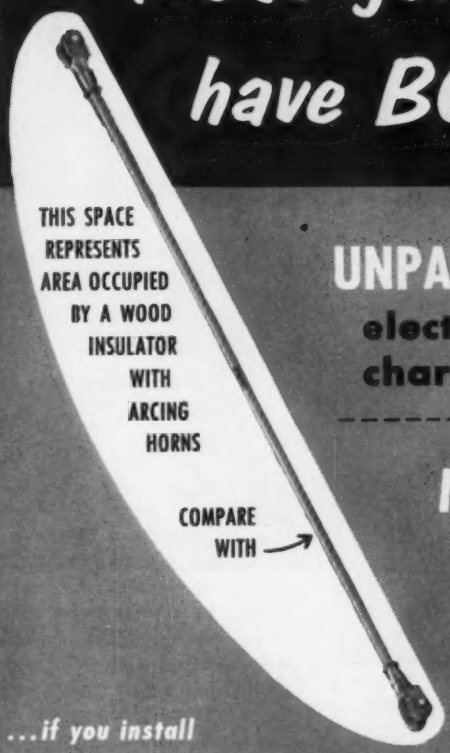
Thomas has been with GE since 1940. In 1944 he was named GE representative for the Hanford Atomic Power Project at Richland, Wash. Since 1957 he has been manager of construction engineering for the systems application engineering section of the user industries sales department.

DeBoer Named President Of Public Power Assn

Dewey J. DeBoer has been elected president of the American Public Power Assn.

DeBoer had been a member of the board of directors of APPA since 1957 and last year served as first vice president of the organization. Since 1951, DeBoer has been executive manager of the Nebraska Public Power System.

NOW you can have BOTH!



UNPARALLELED electrical characteristics

MINIMUM occupied SPACE

...if you install

HUBBARD Fiber Glass Strain Insulators

TOP CONSIDERATIONS in rating Strain Insulators dictate the choice of **HUBBARD** because . . .

ONE: "Unparalleled Electrical Characteristics" which mean permanently maintained, high insulation values resulting from the use of materials impervious to moisture or decay.

TWO: "Minimum Occupied Space" because *NO ARCING HORNS* are necessary. This means shorter guys, less interference with other structural components and LOWER INSTALLED COST.

BETTER PRODUCTS *through Creative Engineering*

HUBBARD and COMPANY

200 SOUTH MICHIGAN AVENUE • CHICAGO 4, ILLINOIS

END
TREE-TRIMMING
PROBLEMS

By using aerial (field spun) cable for distribution lines, practically all tree-trimming is eliminated during the installation and for the rest of the cable life.

The freedom from maintenance experienced with this type of installation makes it a very economical distribution plant.

★ ★ ★

For descriptive literature on tools for spinning aerial cable, write or phone

★ ★ ★

Phone CE 2-7234

CABLE SPINNING EQUIPMENT CO.
Topeka Kansas

Greensward Heads Canadian A-C

GREENSWARD SCHUDT

J. D. Greensward has been named president of Canadian Allis-Chalmers Ltd, a wholly owned Allis-Chalmers Manufacturing Co subsidiary. He succeeds Harold M. Schudt, who has been named director of manufacturing, Allis-Chalmers International.

Greensward had been director of manufacturing, Industries Group, and a vice president of Allis-Chalmers since 1952. He joined A-C in 1922. In 1946 he was named assistant to the vice president in charge of the General Machinery Division. He then became general manager of the Norwood, Ohio, Works. Later, in addition to that position, he was named manager of the apparatus department.

Schudt in his new position will direct the manufacturing of activities for the firm's foreign plants. He has been with Allis-Chalmers since 1929, and served in the Tractor Division's engineering department, manufacturing operations in England, and as general manager of the Gadsden, Ala., Works.

PERSONAL BRIEFS

M. J. Cuadra has been promoted to general superintendent in charge of electric and gas operations of Arkansas-Missouri Power Co. **R. M. Jamison** was promoted to assistant general superintendent; **W. M. Pontz,** director of planning and engineering; and **Owen Preston,** superintendent of production.

Stanley M. Hunt replaces **Philip C. Pray** who retired from the New England Electric System. Hunt will report to Vice President Frank R. Joslin on divisional activities, and is responsible for the operation of distribution systems of the affiliated Merrimack-Essex Electric Co, Suburban Electric Co, and Lynn Gas & Electric Co. **Richard W. Smith** will head up all distribution in the northeastern area. **Ernest F. Walsh** has been made manager of steam operations for NEES; **Paul R. Welch,** executive assistant to Vice President E. F. Ziegler, and **A. J. LaCroix,** assistant plant engineer at the Salem Harbor steam plant.

Jake Mabe has been named to the newly created post of superintendent of transmission at Central Power & Light Co, and **M. D. Foster** succeeds him as division engineer for Power Division No. 4.

Ray Pool has been made chief engineer of Public Service Co of Oklahoma's new $20 million Northeastern power station near Oologah Dam.

Appalachian Power Co has named **Paul E. Hilliard,** division supervising engineer of the Bluefield Division, succeeding **A. L. Wellford**

Jr, who retired. **McKinley Cornett** becomes division station engineer, and **James J. Harman,** division senior station engineer.

Donald T. McPhee has been appointed manager of production at Kansas City Power & Light Co.

Retired: **Carroll L. Proctor,** chairman of the board of directors, Toledo Edison Co; **Clarence Arnott,** superintendent of electric generating stations, British Columbia Electric Co; **T. A. Schlink,** chairman of the board of Central Illinois Light Co; Vice President **Philip R. Morss,** Simplex Wire & Cable Co; **Abbott L. Penniman Jr,** vice president-electric operations at Baltimore Gas & Electric Co; **Arthur F. Ager,** assistant director of the Southern California area of the State Public Utilities Commission; **Elmer E. Kime,** vice president-operations, California-Pacific Utilities Co.

E. G. Nielsen has been appointed administrator of the Arizona Power Authority. He succeeds **W. S. Gookin** who is now a consulting engineer for the combined Arizona Power Authority and Interstate Stream Commission.

W. D. Gill has been made superintendent of transmission and distribution maintenance at British Columbia Electric Co. **Ted Collins** has been made superintendent of electric generating stations.

Carl Williams has become general manager of the First Electric Cooperative, Jacksonville, Ark.

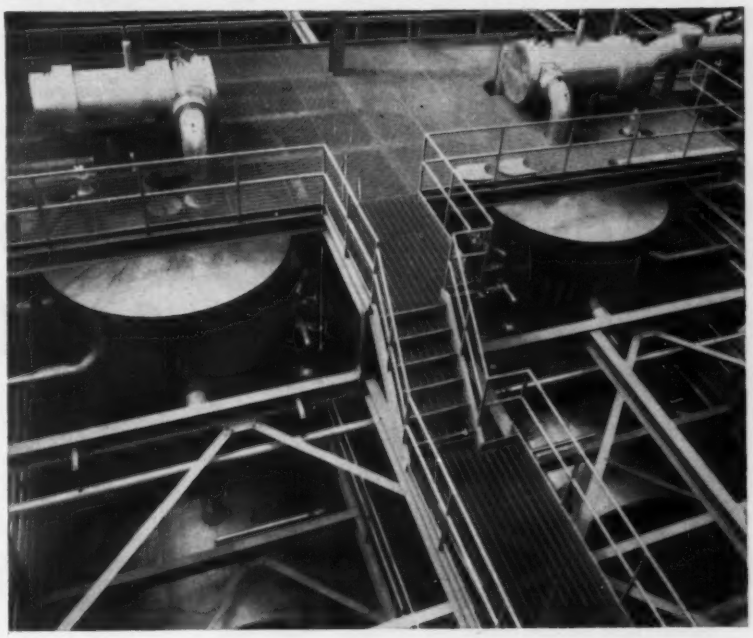
Kenneth G. Scantling has been appointed superintendent, transportation section, Duquesne Light Co.

Three changes in the Central Hudson Gas & Electric Corp's commercial department are: **Edwin T. Strong** to manager of the new business development division; **Roland C. Becker,** to assistant to the vice president; and **William E. VanWagener** to district resident manager.

Willard S. Wilder, electrical engineer for Wisconsin Electric Power Co, has been named a "Fellow" in the American Institute of Electrical Engineers "for contributions to the

(*Continued on page* 86)

FLUIDICS* AT WORK



How they're saving feedwater dollars at L.A.'s new Scattergood Steam Plant

Each of these two 12'-diameter, 1,036,250-lb/hr-capacity Permutit spray-type deaerators, nests atop its own 160,000-lb. storage tank in the new Scattergood Steam Plant at Los Angeles. The only open direct-contact-type heater with five closed heaters operating on the regenerative cycle, each deaerator operates at 20 psia to 52.8 psia. Design pressure is 100 psig, ASME code.

These deaerators process boiler feedwater for normal throttle steam conditions of 1800 psig at 1000° F with 1000° F reheat.

The City of Los Angeles can't afford to have corrosive oxygen or CO_2 in that water.

And it doesn't, because Permutit deaerators are *guaranteed* to remove all free CO_2 and to reduce oxygen to less than 0.005 m. per liter.

Save money

These deaerators save operating dollars because they have several advantages over tray or other types of deaerators. Maintenance is minimized, due to simplicity of design. Uniform, wasteless distribution of steam through water in scrubber, at *all* rates of flow from zero to full capacity. No water hammer, no rumbling—in short, quiet operation.

Besides these heaters, two more Permutit deaerators are used at Scattergood to prepare feedwater for evaporators.

Ultimately, Scattergood will have four generating units producing a total of 1,200,000 KW, almost equalling Hoover Dam. There's no room for boiler troubles in this kind of operation.

30-page bulletin

You can get the same feedwater purity and dollar savings, with Permutit deaerators (3000 to 3,000,000 lb/hr) and other water treatment facilities available through our Fluidics program. To start, send for our fact-filled 30-page bulletin, "Spray Type Deaerating Heater."

For more information, write PERMUTIT Division, Dept. EW-50, 50 West 44th Street, New York 36, N. Y., or call your local Permutit representative. In Canada: The Permutit Company of Canada, Ltd., 207 Queens Quay West, Toronto, Ontario.

*FLUIDICS is a complete, imaginative Pfaudler Permutit program which economically provides practical answers to problems involving fluids and gases.

PFAUDLER PERMUTIT INC.

Specialists in FLUIDICS...the science of fluid processes

Employee Gift Matching

Another Good Way To Help Our Colleges And Universities

The business community continues to make an impressive record in giving badly needed financial help to our colleges and universities. This year the Council for Financial Aid to Education expects that business contributions to higher education will be well over four times their total of about $40 million a decade ago.

If these contributions, which were about $150 million last year, continue to increase at the present rate, they will hit the target of $500 million set for business aid to our colleges and universities in 1970. This is the amount which, the Council calculates, must come from business if these institutions are to have the money to do their job properly a decade hence.

However, it would be a fine thing both for the nation and the business community if that $500 million dollar target were hit well before 1970. This would put us ahead of a schedule (it is a conservative schedule) in getting on top of what remains one of the nation's most crucial problems—that of having its colleges and universities adequately financed which they are very far from being right now.

There is, we believe, one quite simple way by which financial support for higher education by business firms might be considerably speeded up. All that is required is that business firms generally abandon the idea that it is possible for every company to have a program to provide such support that is novel and distinctive, and that this is the only way that interests of prestige and good public relations can be served.

There are nowhere near enough good plans to provide financial help for higher education to equip even a small percentage of our business firms with one that is novel and distinctive. Also **there are a number of very good plans which, so far as we can tell, lose nothing of their value for prestige and good public relations by being used by a large number of companies.**

The Gift Matching Idea

One plan with these attractive characteristics is the plan by which companies match the gifts of their employees to colleges and universities, and now increasingly gifts to independent secondary schools. So far as we can discover the general plan was invented by the General Electric Company, with what it calls its Corporate Alumnus Program. Now, with variations on the same basic design, almost 100 companies have gift matching plans. We at McGraw-Hill are included in this number.

The gift matching plans vary considerably in detail. Some are limited to alumni of the schools to be benefited. In others any employee can participate by making a gift to an eligible institution. There are also variations in the maximum amounts of gifts by individuals and to individual institutions which will be matched. Some companies have "open end" plans; others limit the total to be matched in any one year. All of the plans, however, embody the same central gift matching idea.

When the plan was first launched some college administrators of little faith in the fundamental generosity of the alumni and friends of their schools expressed the fear that if gifts were to be matched they might be made smaller in the first place. The opposing view was that the possibility of having them matched would stimulate more and larger gifts.

Advantages Of Gift Matching

So far as we have been able to discover, the expectation that giving would be stimulated by gift matching has been validated by the experience with the plans. This has been our experience at McGraw-Hill. Some other important virtues of the gift matching programs have been summarized by

LEADERS OF SOME OF THE INSTITUTIONS WHICH HAVE SHARED IN THE McGRAW-HILL EMPLOYEE GIFT MATCHING PROGRAM EXPRESS THEIR VIEWS

"We particularly appreciate the fact that your grant is unrestricted, and can therefore be used for our area of greatest continuing need — the General Education Fund, from which faculty salaries come."

W. BOYD ALEXANDER, Vice President and Dean of the Faculty
Antioch College

"We are grateful, not only for the financial support given to The Cooper Union by your company, but also for the stimulus it has provided our alumni in your employ to make annual gifts to their Alma Mater."

EDWIN S. BURDELL, President
The Cooper Union

"The gift matching program has a dual advantage. First, it acknowledges and repays a debt of honor to those colleges which, often at great loss to themselves, have trained and educated the men who are now among your personnel. This is most fair and equitable. Secondly, by offering to match up to a given limit the contributions of alumni, you encourage support of their own colleges on the part of graduates, who themselves are so indebted."

President EDWARD B. BUNN, S. J.
Georgetown University

"Thanks to your doubling of the annual gifts of one of our generous and loyal friends who works with you at McGraw-Hill, we are well on the way toward creating what for us will be an extremely helpful scholarship fund. This would not have been possible without the gift matching program."

C. ADRIAN HEATON, President
California Baptist Theological Seminary

Ernest T. Stewart, Executive Director of the American Alumni Council (1785 Massachusetts Avenue, N.W., Washington, D.C.) who would be glad to provide detailed information about them, and the names of companies having such plans. Of the gift matching idea he says,

> "*First*—it assures the corporation that its gifts go direct to those colleges and universities which have furnished it with trained manpower.
>
> "*Second*—it places responsibilities for the gifts on the institutions themselves and drives home the point that they must make a real effort with their own alumni.
>
> "*Third*—it leaves the final decision of corporate support basically to the employees."

For many companies which are fearful of complicating their relations with their customers by courting charges of favoritism if they provide direct financial support for any particular school or group of schools, this latter consideration can be of decisive importance.

The gift matching plan also has what for many companies is the very important virtue of being simply and easily administered. Some additional virtues of the gift matching plan, as seen by officers of institutions which have been beneficiaries, are indicated in the box at the top of this page.

Effective And Easily Managed

We at McGraw-Hill are well pleased with our gift matching program. It is a broad program in which all employees and a wide array of colleges and universities, both privately and publicly supported, are eligible to participate. We commend it as an effective and easily managed plan to provide urgently needed financial aid to higher education.

We also urge that business firms adopt this or one of a number of other very good programs of financial aid to higher education* rather than delay in the hope of hitting upon some quite new and distinctive plan. There are very long odds that such delay will prove unavailing. In the meantime our colleges will be losing financial help which it is profoundly in the interest of the business community and the nation to see that they get—and get fast.

---

*An earlier editorial in this series dealt with tuition supplements as another good way to help our colleges and universities. Reprints of this editorial are available. So are copies of a "more or less socratic dialog," entitled, **A Business Wrestling with the Problem of Aid to Colleges and Universities.** It was prompted by the efforts of McGraw-Hill to find suitable methods of providing financial aid to higher education.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nation-wide developments. Permission is freely extended to newspapers, groups or individuals to quote or reprint all or parts of the text.

Donald C. McGraw
PRESIDENT

McGRAW-HILL PUBLISHING COMPANY, INC.

(*Continued from page* 83)
direction of design of power plants, transmission and distribution facilities of a large public utility."

Frank Freeland has joined the rate department of Commonwealth Services Inc.

Charles L. Cummons has become chief of operations at the New York State Power Authority's Niagara Falls development.

Edward J. Rommel, vice president of Dayton Power & Light Co, has been named outstanding University of Michigan alumnus in the Dayton area for 1959.

Robert E. Walker, has been named manager of the Cleveland Electric Illuminating Co's new systems and procedures department.

Robert E. Waldo has been named assistant treasurer of the Columbus & Southern Ohio Electric Co.

J. G. Loader has been elected assistant secretary and assistant treasurer of Florida Power Corp.

Stewart H. Butler has joined the personnel department of Pacific Power & Light Co.

William L. Sheets has been named senior construction manager of Stone & Webster Engineering Corp.

Northern Indiana Public Service Co has formed a new Northeastern Division headed by **Daniel O. Kreitzman. Jack W. Stine** has been named manager of the Elkhart district; **James D. Breed,** manager of the Goshen district succeeding **W. Dean Shannahan,** retired; and **Paul E. Seybert,** manager of the South Bend district.

William C. MacInnes, president, Tampa Electric Co, has been named recipient of the annual Management Achievement Award, presented by the University of Florida Chapter of the Society for Advancement of Management.

Duquesne Light Co has appointed **J. W. O'Nan,** manager, industrial sales department; and **A. J. Smalley,** manager, residential sales department.

Mildred K. Milby has been named home service director, Indianapolis Power & Light Co.

John P. Rossie has become a partner, with the title of executive engineer, at R. W. Beck & Associates, utility analysts and engineers in Seattle, Wash.

Glenn O. Ladd has joined Commonwealth Services' Rate Department.

Judson Hyde has been elected to the board of directors of Burns & Roe, Inc.

Frank McLaughlin has retired as board chairman of Puget Sound Power & Light Co. He will continue as a director of the company as well as an adviser and consultant. The position of board chairman will not be filled.

C. A. Liming has been appointed corporate engineering manager-pole type equipment at Federal Pacific Electric Co. He was formerly sales manager-electrical apparatus for Hubbard & Co.

Richard G. Nolte has been elevated to executive vice president of Duff-Norton Co. **T. W. Krueger** has been promoted to vice president and general sales manager, and **Cleighton Hilbert,** vice president-manufacturing.

Robert M. Lewison has been promoted to manager of the International Division at Fischer & Porter Co.

Marshall A. Williams has become director of a new department of marketing for Simplex Wire & Cable Co.

OBITUARY

John R. Horton, 63, general superintendent of power, Louisiana Power & Light Co . . . **Harry E. Vordermark,** 85, former treasurer for Indiana Public Service Corp . . . **Verne N. Kent,** 69, former Tacoma City Light superintendent . . . **Lewis A. Lewis,** 78, former assistant general manager of Washington Water Power Co . . . **Lester E. O'Brien,** 63, retired electrical engineer for Bonneville Power Administration.

PROFESSIONAL SERVICES

BLACK & VEATCH
Consulting Engineers
Electricity—Water—Sewage—Industry
Reports, Design, Supervision of Construction
Investigations, Valuations and Rates
1500 Meadow Lake Parkway
Kansas City 14, Missouri

THEODORE D. BROSS LINE CONSTRUCTION CORP.
Steel Tower & Wood
Transmission Lines
Distribution & Maintenance
175 Enfield St. Hartford, Conn.

COMMONWEALTH SERVICES INC.
Management and Business Consultants
200 Park Ave.
New York 22, N. Y.

ASSOCIATES INC.
Consulting and Design Engineers
209 E. Washington
Jackson, Michigan

JENSEN, BOWEN & FARRELL
Engineers
Appraisals—Depreciation Studies—Property Records
Cost Trends—Special Studies—Reports for Rate Cases, Security Issues, Regulatory and Accounting Requirements
Michigan Theatre Building Ann Arbor, Michigan
NOrmandy 8-7778

MULTI-AMP DIVISION
MULTI-AMP ELECTRONIC CORPORATION
Designers • Engineers • Builders
Portable electric test equipment
Field and laboratory instruments; load boxes.
For low voltage testing and calibrating of circuit breakers, protective and overload relays, reclosers, watt hour meters, fuse links.
467A Lehigh Ave. Union, N. J.

PIONEER SERVICE & ENGINEERING CO.
Consulting and Design Engineers . . Purchasing Specialists in Financing Accounting and other Operations
231 So. La Salle St. Chicago 4

SANBORN MAP COMPANY, INC.
Nation Wide Mapping Services
• Utility Area Base Maps
• Symbolized System Portrayal
Atlanta - New York - Chicago - San Francisco

SARGENT & LUNDY
Engineers
Consultants to the Power Industry
STUDIES • DESIGN • SUPERVISION
140 South Dearborn Street, Chicago 3, Ill.

TIPPETT & GEE
Consulting Engineers
Mechanical • Electrical • Thermodynamic
Structural Design • Studies • Supervision
Power Stations • Transmission • Distribution
Industrial Plants • Process
1333 North Second Street Abilene, Texas

CLASSIFIED **SEARCHLIGHT SECTION** ADVERTISING

EMPLOYMENT • BUSINESS • **OPPORTUNITIES** • EQUIPMENT—USED or RESALE

DISPLAYED RATE:

EMPLOYMENT OPPORTUNITIES: $25.50 per inch. Subject to Agency Commission.
EQUIPMENT & BUSINESS OPPORTUNITIES: $16.85 per inch for all advertising appearing on other than a contract basis. Not subject to Agency Commission.
AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches—to a page.
EQUIPMENT WANTED or FOR SALE ADVERTISEMENTS acceptable only in Displayed Style.

RATES

UNDISPLAYED RATE:

$1.80 a line, minimum 3 lines. To figure advance payment count 5 average words as a line.

PROPOSALS, $1.80 a line an insertion.
BOX NUMBERS count as one line additional in undisplayed ads.

DISCOUNT OF 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

Send New Advertisements to Classified Advertising Div. of Electrical World, P. O. Box 12, N. Y. 36, N. Y.

TRANSFORMERS

1—6667 kva Westinghouse, 3/60/115,000Y/13750
1—6000 kva G.E. 3/66000/2400/4160Y
1—2000 kva Nia. Askrael, 3/13800/14160Y/2400
3—1000 kva Westinghouse, 1/22900/480
3—1000 kva Westinghouse, 1/13800/480
3—1000 kva Westinghouse, 1/13800/2400/4160Y
3—1000 kva Standard, 1/44000/8900
3—1000 kva Standard, 1/69000/4160Y/2400
3—1000 kva Standard, 1/34400/480
3— 833 kva Allis Chalmers 1/60/12,000—480
3— 200 kva Westinghouse, 4800—240x480
3— 100 kva G.E., 2400/4160Y—120x240
3— 75 kva G.E., 2400/4160Y—120x240

ERIE ELECTRIC CO., INC.
26 Mechanic St. Buffalo 2, N. Y.

FOR INFORMATION

About Classified Advertising

Contact The McGraw-Hill Office Nearest You.

ATLANTA, 3
1301 Rhodes-Haverty Bldg. *JAckson 3-6951*
R. POWELL

BOSTON, 16
350 Park Square *HUbbard 2-7160*
M. J. HOSMER

CHICAGO, 11
520 No. Michigan Ave *MOhawk 4-5800*
W. J. HIGGENS

CLEVELAND, 13
1164 Illuminating Bldg. *SUperior 1-7000*
W. B. SULLIVAN

DALLAS, 2
1712 Commerce St.,
Vaughan Bldg. *Riverside 7-5117*
GORDON JONES - F. E. HOLLAND

DENVER, 2
1700 Broadway, Tower Bldg. *ALpine 5-2981*
J. PATTEN

DETROIT, 26
856 Penobscot Bldg. *WOodward 2-1793*

LOS ANGELES, 17
1125 W. 6 St. *HUntley 2-5450*
W. C. GRIES

NEW YORK, 36
500 Fifth Ave. *OXford 5-5959*
H. T. BUCHANAN - R. P. LAWLESS
T. W. BENDER

PHILADELPHIA, 3
Six Penn Center Plaza *LOcust 8-4330*
H. W. BOZARTH - H. NICHOLSON

PITTSBURGH, 22
1111 Oliver Bldg. *EXpress 1-1314*
P. PIERCE

ST. LOUIS, 8
3615 Olive St. *JEfferson 5-4867*

SAN FRANCISCO, 4
68 Post St. *DOuglas 2-4600*
S. HUBBARD

OFFICIAL PROPOSALS

Bids: June 20, 1960

Power Transformers

TENDER

Tenders are invited for the supply of:—
POWER TRANSFORMERS

Specifications may be obtained on writing to the Purchasing Officer, Trinidad and Tobago Electricity Commission, P.O. Box 121, Port-of-Sapin, Trinidad, W. I.
Closing date for Tenders 20th June, 1960.

ADDRESS BOX NO. REPLIES TO: Box No. Classified Adv. Div. of this publication. Send to office nearest you.
NEW YORK 36: P. O. Box 12
CHICAGO 11: 520 N. Michigan Ave.
SAN FRANCISCO 4: 68 Post St.

POSITIONS VACANT

Utility Manager; overseas location. Minimum of 10 years experience in systems involving generation, transmission & distribution. Will head 3 man team, including American Accountant and operation engineer. This team will coordinate contract operators of system, supervise collecting, train local personnel, report to Power Authority Board. Please submit complete resume and salary requirements to P-4508, Electrical World.

Wanted—Electrical Engineers. Minimum five years experience in public Utility Distribution. Transmission. Metering and Relaying. Required for permanent, responsible positions in Venezuela. Spanish an asset but not essential. Good living conditions. Starting salary of $13,000 per annum. P-3537, Electrical World.

Executive Electrical Engineer—For large Chicago electrical contracting firm; must have contractor experience. To handle top engineering and estimating department; be able to analyze estimates and costs; supervise shop drawings. Sales experience required. Salary $12,000 to $15,000 plus bonus (based on profits) which should equal salary. Additional profit sharing fund set-up for retirement, and other fringe benefits. P-4424, Electrical World.

Rapidly expanding Southwestern utility offers excellent opportunity for an equipment journeyman under age 40 to be assigned substation maintenance. Applicants should be thoroughly familiar with (6 to 8 years experience) transmission and distribution switching operations, maintenance of oil and air circuit breakers (5000—115000 Volt), substation transformers, bushings, tap changers and cooling equipment as well as auxiliary relays and batteries. Address complete resume of experience and education to: Public Service Company of New Mexico, P. O. Box 1360, Albuquerque, New Mexico. Attention: Mr. W. L. Hunt.

Plant Manager—Municipal Utility. Requires Electrical Engineer or equivalent. Experienced in Operation and Management of Municipal Light Plant. Experience required in Utility Accounting, Power Contracts and Plant Expansion Programs. Submit resume with availability and salary requirements to Box 327, Sterling, Mass.

Results Engineer—Far East Electrical Utility requires graduate mechanical engineer or equivalent to plan and supervise power plant efficiency program. Must have five years minimum experience in all categories of power plant testing, analyses, reporting, scheduling, etc. Unattached man preferred. Salary $11-13,500. Chief Plant Engineer—Need operating engineer to assume production responsibilities in a 46 MW plant with approximately 90 employees. Must have seven years minimum experience under similar conditions in U. S. plant. Salary $11-14,000. Excellent working and living conditions. One year contract with renewal option. Submit complete confidential resume to Gilbert Pacific, Incorporated, Att'n R. W. Roughton, P. O. Box 1498, Reading, Pennsylvania.

SELLING OPPORTUNITY AVAILABLE

Representative wanted for manufacturer of street lighting equipment pole line specialties. Full particulars. RW-9821, Electrical World.

SYNCHRONOUS MOTORS WANTED

One (1) 1750 to 2000 HP double or single-ended shaft, 720 RPM unity power factor snychronous motor, arranged for operation on 13,800 Volt, 3 Phrase, 60 Cycle AC service, complete with one (1) set of magnetic reduced voltage starting equipment with accessories and with an interrupting capacity of 150,000 to 250,000 KVA.

One (1) 2500-3000 HP double ended shaft, 720 RPM unity power factor synchronous motor arranged for operation on 13,800 Volt, 3 Phrase, 60 Cycle AC service, complete with one (1) set of magnetic reduced voltage starting equipment with accessories and with an interrupting capacity of 250,000 to 350,000 KVA.

WRITE Harvey Aluminum, Attn: Don Sherbon, 19200 S. Western Avenue, Torrance, California.

USED INDOOR OPEN TYPE SWITCHBOARD

Consisting of:

2—Westinghouse three phase induction regulators, five percent regulation, 364 KVA, 1000 amperes, 4200 primary voltage, automatic control.

2—Oil circuit breakers for above, double throw, mechanically interlocked, type "F11", 200A, 5KV, Westinghouse. (manually operated)

1—Switching reactor for above.

17—Westinghouse oil circuit breakers, three-pole, 7.5 KV, 400A, 50 MVA, type "F124" manually operated, 48 V.D.C. trip coil. Complete with operating handle thru switchboard.

17—Panels for above, complete with type 'S' ammeter and voltmeter, three overcurrent relays, type 'CO', one "OB" watthourmeter, two element, three current transformers, one three element ammeter switch.

17—Three pole disconnect switches, 400 Amps, 7500 V. single throw.

Complete steel frame for switchboard and necessary copper bus runs.

4—Three pole disconnect switches, 600 A, 7500 V, double throw.

Our drawing S4-10862.

To be seen completely erected at
CITY OF RIVERSIDE LIGHT DEPT., CALIF.
854 Mulberry Street.

To be sold complete or in parts.
For information concerning equipment write or call

ERHARD BENDER
3854 Mulberry St. Riverside, California
Phone: OVerland 6-7575

Niagara Mohawk Cuts Back Power Production

The Niagara Mohawk Power Corp, with a surplus of electric power and more coming from the new Niagara project, announced plans for a sharp cutback in power generation at its Huntley Station on River Road.

Huntley Station is one of the largest steam power-generating facilities in the country.

Two of the 12 generators at Huntley, each producing 102,000 kw of electricity, will be deactivated. Two other units, a 90,000-kw and a 98,000-kw, will be taken out of operation "within a few weeks."

The four units to be deactivated account for 392,000 of Huntley's 1,186,000 kws of capacity.

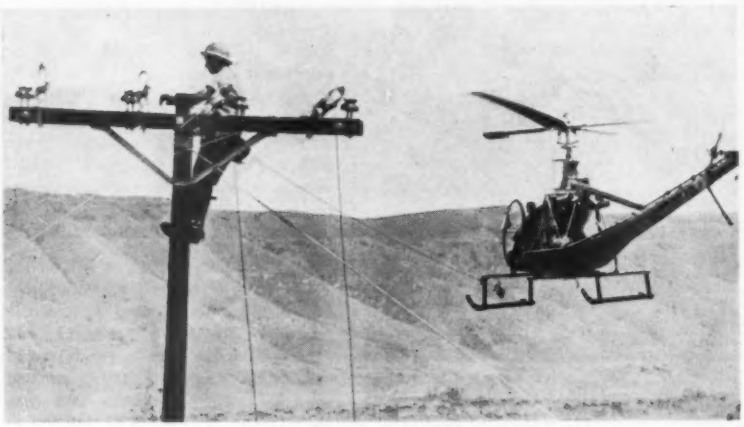
"Plentiful power" to meet present demand and additional power early next year from the State Power Authority's Niagara hydro station now under construction were among the reasons cited by Niagara Mohawk for the cutback at Huntley.

The reduction comes at a time when area steel plants, the biggest customers of the power company, have sharply curtailed production operations.

The power company said the deactivated power generators at Huntley will be kept on a standby basis. But it was indicated they may be idle for some time.

The generators will be reactivated when additional power that is to come from Niagara has been absorbed and when "anticipated load growth makes it necessary to increase Niagara Mohawk generating requirements."

Power from the new Niagara hydro station won't start flowing until February 1961.



Up in the Air Over Power Lines and Poles

The first reported helicopter-strung power line in the Pacific Northwest came into being recently in Rufus, Ore. Portland General Electric Co lineman Al Pyatt guides the line through a pulley over the king pole, as pilot Wes Lematta strings it by backing off in the 'copter. The machine is used also to set poles.

Besides the relative ease of stringing line and setting poles this way, compared to more conventional methods, the helicopter operation affords a considerable saving in time and money.

High Mountain Sheep State License Approved

Contrary to past policy of the Oregon Hydroelectric Commission, it has approved an application by Pacific Northwest Power Co to build High Mountain Sheep dam on the Snake River.

State licenses were never issued to Idaho Power Co for its Snake River projects, or to Portland General Electric Co for the Pelton Project on the Deschutes River.

Advertising Index

Acme Wire Co. 61
Anaconda Wire & Cable Co. 66, 67

Baldwin-Lima-Hamilton Corp. Industrial Equipment Div. 18
Blackburn Corp., Jasper 19

Cable Spinning Equipment Co. 82
Chance Co., A. B. 57

Delta-Star Electric Division H. K. Porter Company, Inc. 62, 63
Directory of Engineers 86
Dow Industrial Service Div. Dow Chemical Co. 22

Electromode Div. Commercial Controls Corp. 79
Engineers, Directory of 86

Fargo Mfg. Co., Inc. 4

General Electric Co. Apparatus Dept. ..... 2nd Cover, 46, 47, 48, 49

Graybar Electric Co., Inc. 7

Hubbard & Company 81

Kerite Company 24

Lapp Insulator Co., Inc. 8, 9
Line Material Industries 17

Moloney Electric Co. ..... 4th Cover

Ohio Brass Co. 23

Pennsylvania Transformer Div. McGraw-Edison Co. 6
Pfaudler Permutit, Inc. 83
Precision Multiple Controls 78

RT&E Corp. 52
Reliable Electric Co. ..... 3rd Cover
Roflan Company 65
Rome Cable Div. of Alcoa 11, 12

Sangamo Electric Co. 58, 59
Searchlight Section 87

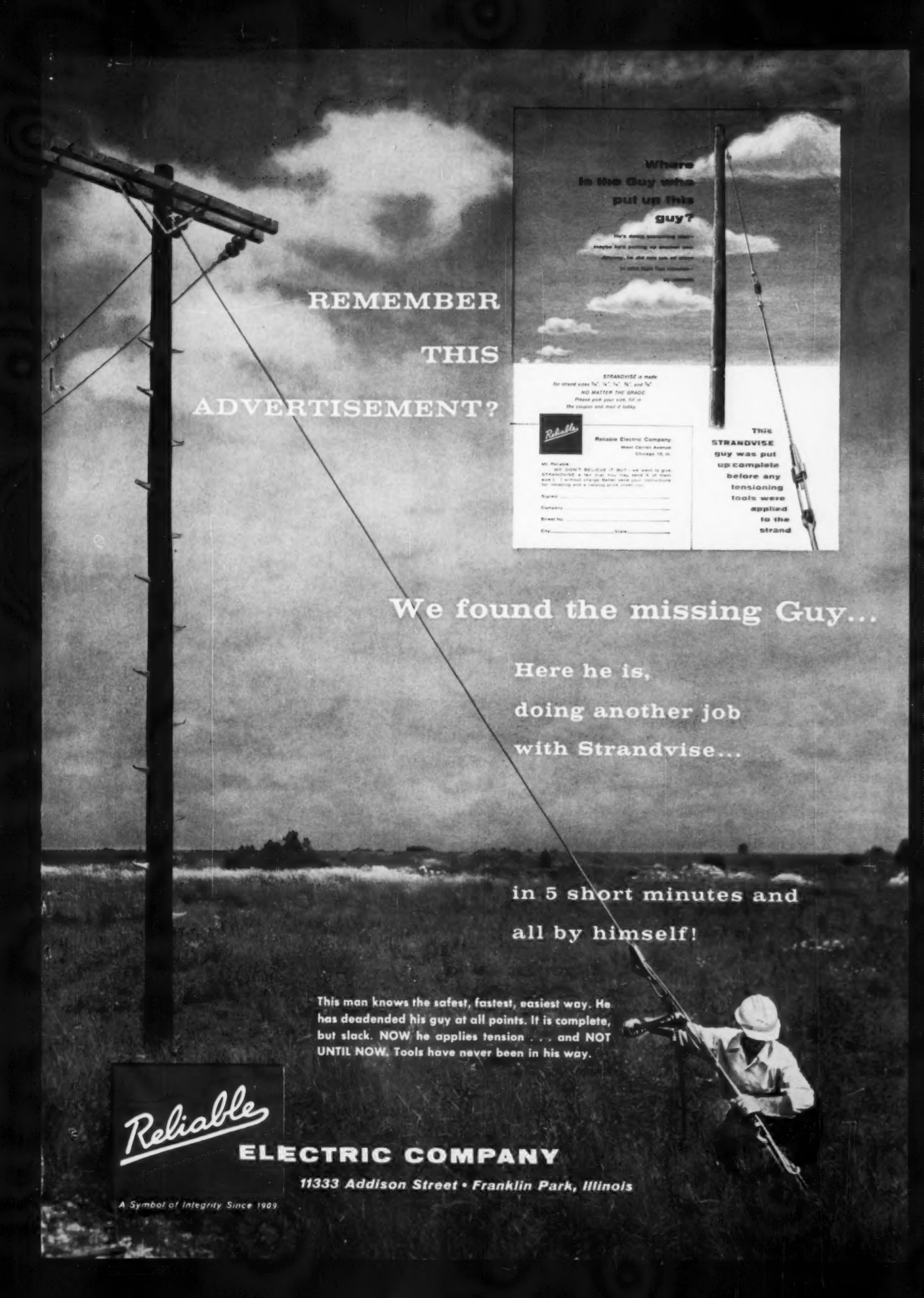
Wagner Electric Corp. 10
Westinghouse Electric Corp. 20, 21, 54, 55, 73, 74, 75, 76

PROFESSIONAL SERVICES 86

CLASSIFIED ADVERTISING
F. J. Eberle, Business Mgr.

EMPLOYMENT OPPORTUNITIES 87

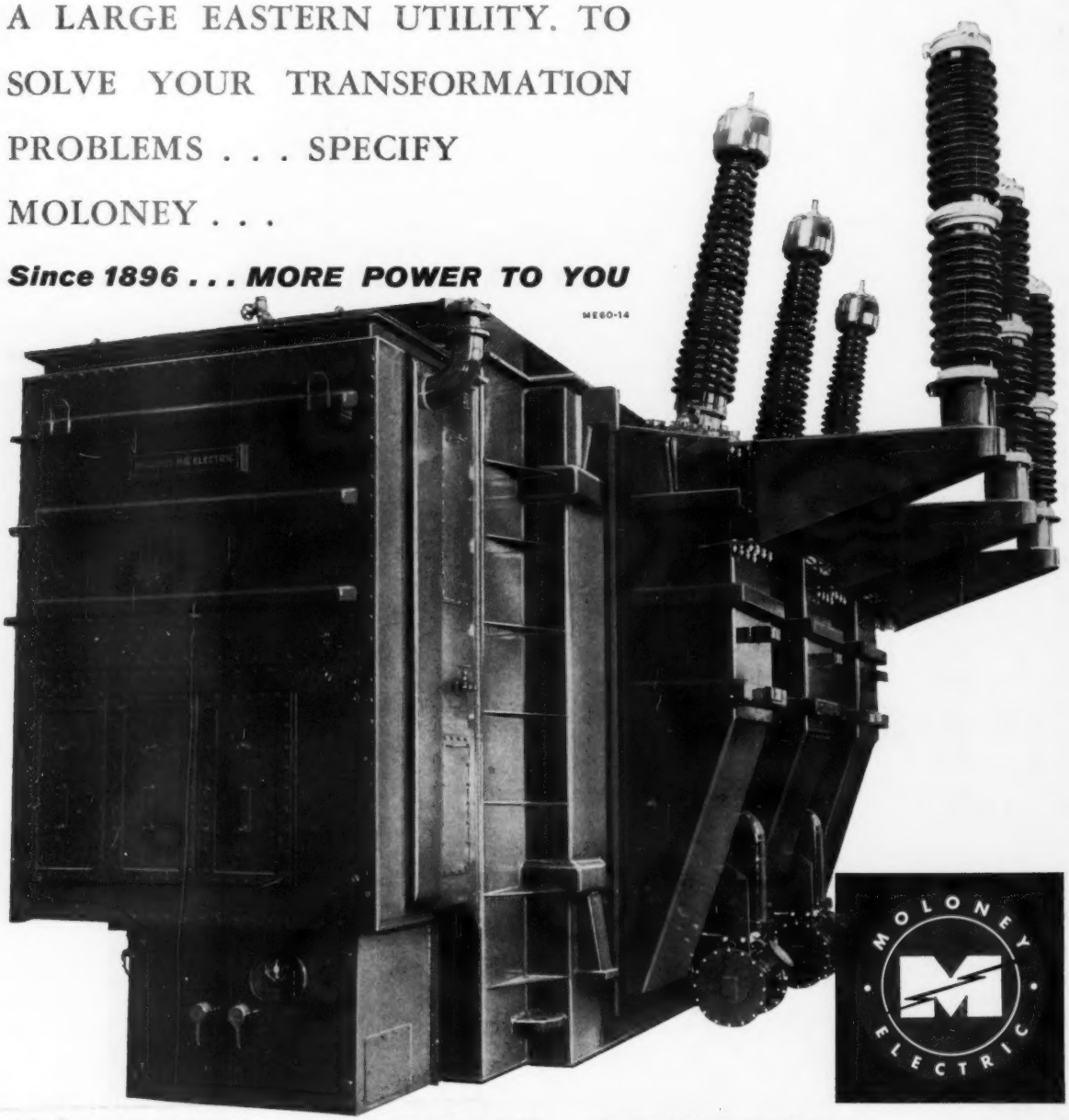
EQUIPMENT (Used or Surplus New) For Sale 87


REMEMBER
THIS
ADVERTISEMENT?
Where is the Guy who put up this guy?
STRANDVISE is made for strand sizes ¼", 5/16", ⅜", 7/16" and ½" NO MATTER THE GRADE. Please pick your size, fill in the coupon and mail it today.
Reliable
Reliable Electric Company
West Carroll Avenue
Chicago 12, Ill.
Mr. Reliable
WE DON'T BELIEVE IT BUT... we want to give STRANDVISE a fair trial. You may send 4 of them and I will, without charge. Better send your instructions for installing with a tensioning grook stringer too.
Name
Company
Street No.
City State
THIS STRANDVISE guy was put up complete before any tensioning tools were applied to the strand
We found the missing Guy...
Here he is,
doing another job
with Strandvise...
in 5 short minutes and
all by himself!
This man knows the safest, fastest, easiest way. He has deadended his guy at all points. It is complete, but slack. NOW he applies tension . . . and NOT UNTIL NOW. Tools have never been in his way.
Reliable
ELECTRIC COMPANY
11333 Addison Street • Franklin Park, Illinois
A Symbol of Integrity Since 1909

100,000 KVA, CLASS FOA, THREE PHASE, SIXTY CYCLES, LTC TRANSFORMER, RATED AS FOLLOWS . . . H.V., 220,000 GRD. Y/127,000 VOLTS; L.V., 36,000 GRD. Y/20,775 VOLTS; T.V., 13,800 VOLTS DELTA @ 35,000 KVA; LTC ± 10% HV REGULATION IN 32 5/8% STEPS. NOW IN SERVICE FOR A LARGE EASTERN UTILITY. TO SOLVE YOUR TRANSFORMATION PROBLEMS . . . SPECIFY MOLONEY . . .

Since 1896 . . . MORE POWER TO YOU

ME60-14



MOLONEY ELECTRIC COMPANY . . .

Transformers for Utilities, Industry, and Electronic Applications

FACTORIES: ST. LOUIS 20, MO., AND TORONTO, ONT., CAN. • SALES OFFICES IN ALL PRINCIPAL CITIES